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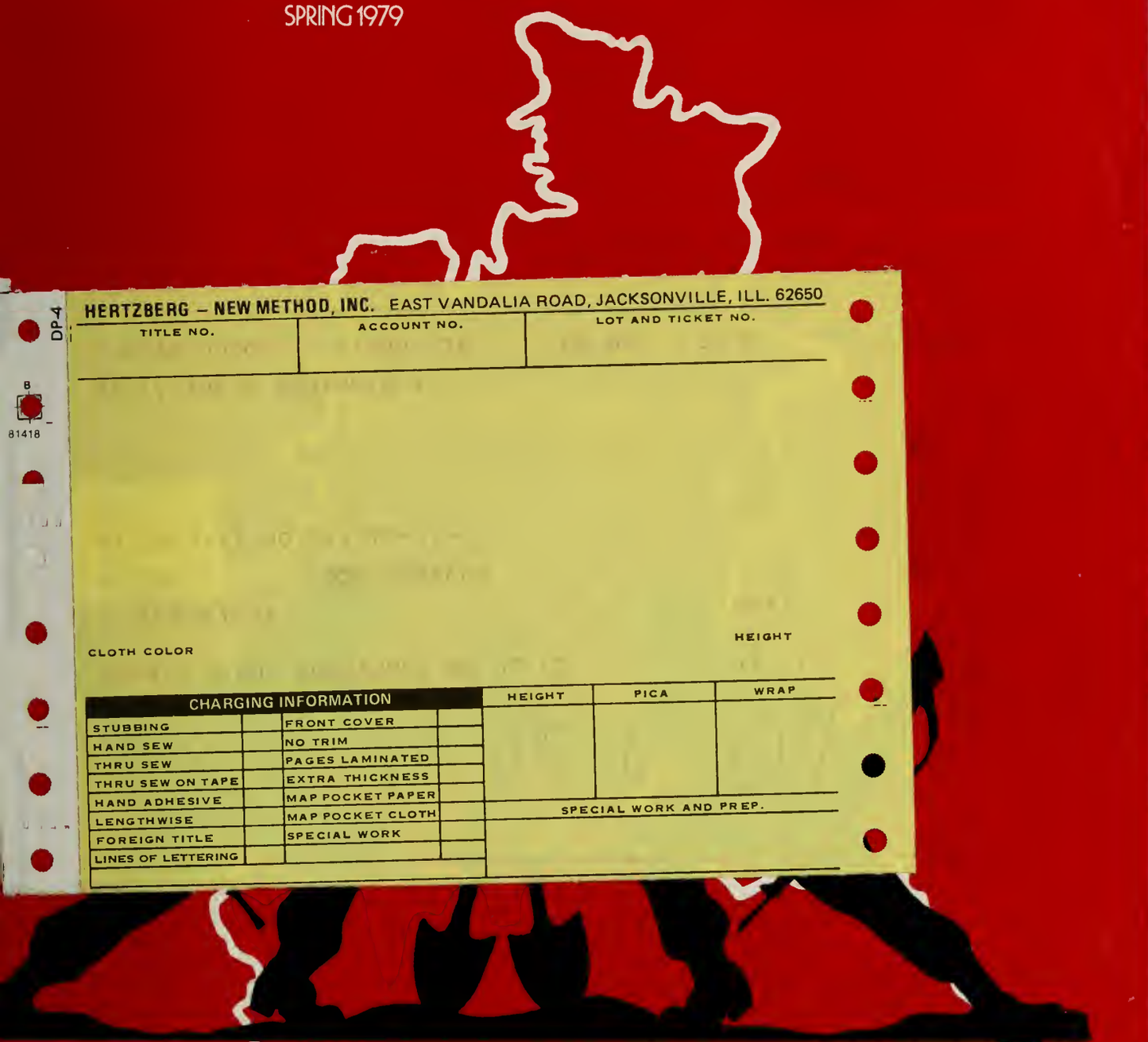
SPRING 1979



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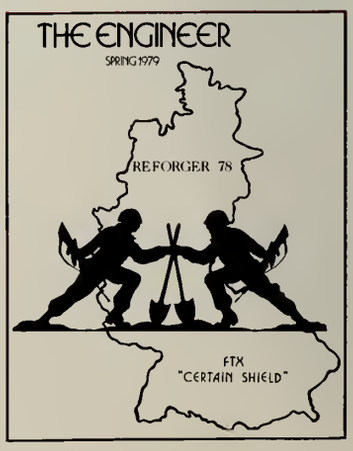
THE COVER

FTX "CERTAIN SHIELD" provided Army engineers of V Corps an unprecedented opportunity for direct involvement with other elements of the combined arms team on a large scale. Cover art by SSG Mike Furr.



THE ENGINEER

VOLUME 9 SPRING 1979 NUMBER 1

FEATURE ARTICLES

6 **THE RED LINE**
Major Arthur J. Parr, Jr.

8 **AN INTERVIEW WITH CSM COWART**

11 **INTEGRATED BASIC TRAINING**
Major Robert C. White

14 **CAMMS 78**
Major John L. Herring

16 **THE WALLMEISTER**
Captain Jerry T. Mohr & Captain James H. Hayes, Jr.

18 **SQT AND ARTEP FEEDBACK**

21 **REFORGER 78: FTX "CERTAIN SHIELD"**
Members of the 130th Engineer Brigade, V Corps

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page 5

page 11

page 28

DEPARTMENTS

2 NEWS & NOTES
4 LETTERS TO THE EDITOR
5 EQUIPMENT UPDATE
20 COMMANDERS' UPDATE
37 ENGINEER PROBLEM
38 OFFICER CAREER INFO
40 ENLISTED CAREER INFO
42 NCO CHANNELS
43 RESERVE COMPONENTS
44 THE SCHOOL SOLUTION

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News & Notes

STURGIS AWARD

Sergeant First Class Lanny R. Hodges of the 94th Engineer Combat Battalion (Heavy), USAREUR, has been selected as the recipient of this year's prestigious Sturgis Award, presented annually to the active duty engineer enlisted soldier who makes the most outstanding contribution in the field of military engineering during the previous calendar year. The award is named in honor of LTG Samuel D. Sturgis, who was Chief of Engineers from March 1953 to September 1956. SFC Hodges, platoon sergeant for the 1st Platoon, B Company, 94th Engineers, earned this year's award with his invaluable contributions to four consecutive military engineering projects, beginning with the Wiesbaden Perimeter Road Project in the fall of 1977. Thereafter, in succession, his platoon tackled the Kirchgoens Maintenance Building Relocation Project, the Butzbach Elementary School Playground Project, and a TDY project supporting the U.S. Military Mission in Teheran, Iran. SFC Hodges' leadership and technical expertise proved critical to the successful completion of each project on or ahead of schedule.

ITSCHNER AWARDS

The 1979 Itschner Award winner for the Active Army is Company A, 12th Engineer Battalion, permanently stationed with the 1st Brigade, 8th Infantry Division, in Lee Barracks, Mainz, Federal Republic of Germany. Alpha Company is commanded by CPT Wyland F. Leadbetter, Jr. Recipients of the Itschner Awards for the Army Reserve and Army National Guard, respectively, are the 332nd Engineer Company (Dump Truck), Kittanning, PA, and Company C, 612th Engineer Battalion, Norwalk, OH. The 332nd is commanded by CPT Ernest M. Cooper and Company C, 612th, is commanded by CPT Dale L. Liebenthal. The Itschner Award is named for Lieutenant General Emerson C. Itschner, Chief of Engineers from October 1956 through March 1961. Itschner Award recipients will be honored at the annual Engineer Dinner May 11 at the U.S. Army Engineer Center and Fort Belvoir.

ENGINEER MOTHER OF FOUR

More women are joining the Army than ever before, but not many are 32 years old and have four children, which makes 2LT Nancy Harrington sort of unique. She was commissioned into the Army Corps of Engineers upon graduation from the University of Missouri at Rolla last December and soon thereafter reported to The Engineer Center at Fort Belvoir to attend the Engineer Officer Basic Course. Lieutenant Harrington gives credit to her husband, Staff Sergeant Richard Harrington, a Combat Engineer, and her four children, aged seven to 13, for encouraging and supporting her through college. When asked what the Army would want with somebody's mother, she responded, "The way I see it, it shouldn't make any difference. You might as well ask what the Army would want with somebody's father." She has been assigned to the U.S. Army Military Activity in Stuttgart, Germany.

PEOPLE

MG William R. Wray has been named Director of the new Military Programs Directorate in the Office of the Chief of Engineers. *MG Louis W. Prentiss* has been assigned as Ohio River Division Engineer. *BG William E. Reed* has been named Assistant Chief of Engineers, Office of the Chief of Engineers, *COL Clyde A. Selleck* has replaced BG Reed as Missouri River Division Engineer. New district engineers named during the first half of 1979 include *COL Donald J. Palladino*, Fort Worth District; *COL James M. Sigler*, Galveston District; *COL William H. Reno*, Memphis District; and *COL George P. Johnson*, Buffalo District. Four engineers assigned to the Facilities Engineering Support Agency have been awarded the Army Commendation Medal for outstanding performance of duty during a heating system emergency at Fort Riley in January. The four are *SFC Donnie S. Walker, SFC Lonnie O. English, SP6 Brian C. Fitzsimmons* and *SP6 Rodney D. Turnridge.*

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ENGINEERS IN REFORGER 79

Four hundred and ninety-seven members of the 5th Engineer Battalion, Fort Leonard Wood, joined almost 13,500 other U.S. Army troops who were airlifted to Europe for the second Winter REFORGER exercise during January and February. The Fightin' Fifth provided engineer support to the 1st Infantry Division (Mech) of Fort Riley, KS, which was the main force deployed with its headquarters and two brigades. The exercise was conducted by the Army's VII Corps and took place in the area between Northern Baden-Wuerthemberg and East Bavaria.

NEW DEMOLITIONS COMPLEX

A unique "ribbon-blasting" ceremony officially opened Fort Leonard Wood's new demolitions complex December 12. The 77-acre complex offers One Station Unit Training trainees practical experience in the use of demolitions on simulated enemy targets and facilities for permanent party and reserve units to learn combat engineer techniques. It includes five light demolitions ranges, a heavy demolition range, and an assault range. The new complex is part of a long-term plan to upgrade all range facilities at Leonard Wood.

CONSTRUCTION TRAINING

Construction of a portable water tower recently afforded members of Fort Carson's 4th Engineering Combat Battalion a rare opportunity for construction training. The 4th Engineers spent two weeks constructing the 126,000 gallon Portable Panel Water Tower at the Transportation Test Center. The portable tower gave the Test Center a water bypass system while its own 300,000 gallon water tower was being drained and refurbished. The portable tower is typical of the kind utilized in battlefield environments.

NBC OLYMPIC GAMES

The second annual Nuclear, Biological and Chemical Olympic Games, sponsored by the 7th Engineer Brigade, are scheduled this year for 23-24 August. The NBC Olympics were especially designed to test and build confidence in the ability of 7th Brigade soldiers to use protective masks and clothing for long periods under great physical stress. The games include four team events and one individual event. Team events include the one-kilometer relay, the free style decontamination exercise, the NBC reaction course, and a challenge volleyball tournament. The one individual event is the 800 meter run. Winners of each event will be awarded gold, silver and bronze medals in addition to four-day passes.

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Letters to the Editor

"How about more articles on how civil works mission of Corps supports Army's mission?" — COL A.C. Costanzo, Board of Engineers for Rivers and Harbors, Fort Belvoir, VA

"Keep up the good work. Look at ARMOR magazine for ideas. THE ENGINEER should be available by subscription. Why did you stop?" — COL C.L. Roberts, Jr., TRADOC Engineer, Fort Monroe, VA

"I find THE ENGINEER to be most informative and an excellent media to dissiminate Engineer info." — SSG Robert M. Dils, Rural Ridge, PA

"Your publication is necessary and serves its purpose. My answer to #8 (Overall, how do you rate information presented in THE ENGINEER?) reflects my own reservations (Moderately useful). I expect that an active engineer would find the magazine highly useful."— CPT Philip E. Neuschele, USAR

"The improvement in THE ENGINEER in the last four or five issues is outstanding. Keep it engineer oriented—enough general military magazines are available: SOLDIERS, ARMY, MILITARY REVIEW, etc." — MAJ J.W. Stanton, Defense Mapping Agency Aerospace Center, St. Louis, MO

"The magazine is informative and enjoyable, but you need to dwell more on how engineer units fit into today's battlefield plans. We've a lot of capability, let's talk about it. How about articles from other branch magazines?" — CPT B.P. Goetz, Satellite Beach, FL

"The quality of this magazine is exceptionally good for reference class use and general information." — SGM Paul G. Lewis, University of Akron, OH

"I would like to see more articles about what lieutenants are doing, including active army, Reserves, and National Guard."—LTC Charles Mabuin, PMS, University of Missouri at Rolla

"An article should be printed on the enlisted grade structure for equipment operators." — CPT Paul H. Joplin, 880th Engineer Battalion, Jefferson Barracks, MO

We would prefer to use this space for "Letters to the Editor," but we received only one legitimate letter during the first three months of this year. Therefore, we decided to publish some of the comments received in response to our readership survey, which was published in the Winter edition of THE ENGINEER. A detailed analysis of the survey is forthcoming in the Summer edition.—JJH

"More input from the National Guard is needed, but as you said in the Winter issue, we in the Guard aren't supporting you. We'll try to do better in the future." — MAJ Clint Tennill, Jr., Pennsylvania Army National Guard

"I would like to see a one-page story (to be used as a fact sheet) on the duties of an engineer lieutenant. It could be used for information by all ROTC units. Stories on the relationship of academic degrees and the Corps of Engineers are also needed." — LTC Franklin A. Flesher, Missouri Western State College, St. Joseph, MO

"I am a supply sergeant and articles relating to supply as applied to a relationship with engineers would be most useful." — SSG N.S. White, Jr., HHC, 30th Engineer Battalion

"ENGINEER does an excellent job. Not as good as INFANTRY, ARMOR, or MILITARY REVIEW. Quarterly is not frequent enough. Monthly or at least bimonthly would be preferable." — LTC James B. Fleming, ARNG Advisor

"Engineer SQTs should be discussed more frequently so that comment can be sent forward to enhance the program." — Anonymous

"Once I lose my subscription, I lose my CE input. I am a nonunit reserve officer who is a MOB DES to HQ-DARCOM. Wearing the Castle automatically says I work with MERADCOM on my two-weeks tour each summer. I also had a two-weeks tour in a District Engineer Office last summer. I NEED the CE input to stay current! Suggestions??" — COL Joseph E. West, Dearborn, MI

"More human interest stories about engineers and about the people behind the engineers would be useful." — SGT Anthony C. Maneri, Fort Devens, MA

"Volume 8, Number 4 of THE ENGINEER had a Tactical Problem where a bridge was destroyed using the water plume technique of demolition. This technique is not explained in 5-34 or 5-25. Please advise where this technique can be found explained." — MAJ William F. Aubuchon, Abilene, TX

"I think we need to look at the USAR more in our magazine. Lots of good work going on." — MAJ John Gossett, Clover, S.C.

"I think the content is good, but it has the appearance of a professional journal. Could be made more informal. How about a "lessons learned" section using Germany, WWII, Vietnam, etc., as source material." — CW4 Leonard Lorge, 507th Engineer Battalion, Wyoming, MI

Equipment Update

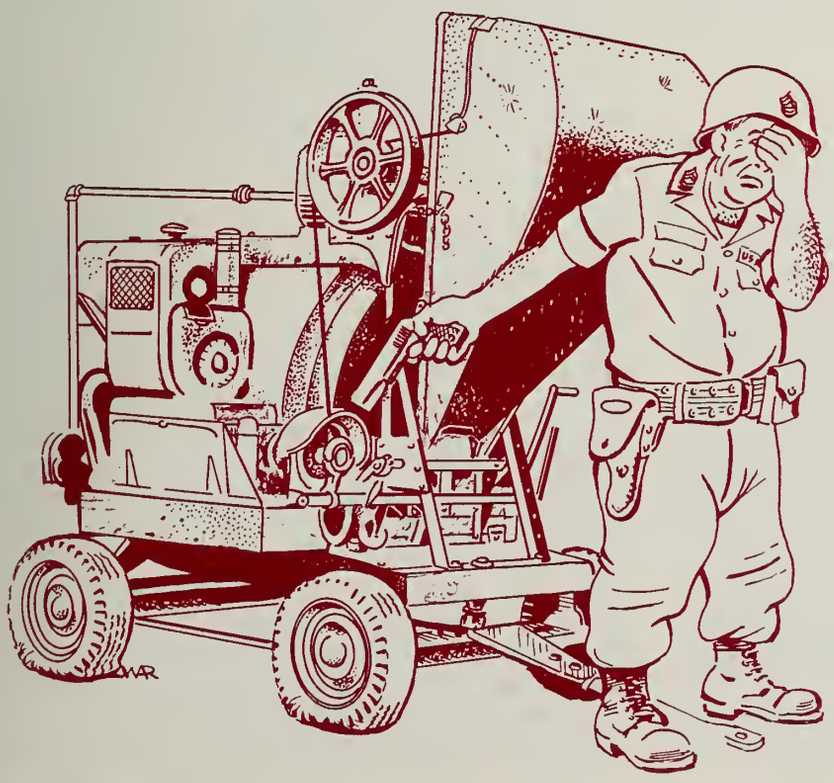
Since the mid-1950s, military engineers have depended on the trailer-mounted, 16-cubic-feet Concrete Mixer for jobs ranging from the construction of bunkers to the construction of bridges. This relatively simple and reliable equipment has seen duty in every corner of the globe. However, most 16-cubic-feet Concrete Mixers currently in the field are quite old and many are frequently "down" for long periods. All too often, Army engineers must rely on more expensive ready-mix concrete because of this lack of dependable mixing equipment.

Help is on the way in the form of the XM-919 Concrete Mobile, a combination material transporter and mobile batching plant. It delivers unmixed materials (cement, water, sand, stone, and admixtures) to the job site, where it can mix up to eight cubic yards of quality concrete, either continuously or intermittently.

Fine and coarse aggregates are carried in bins on either side of the Concrete Mobile. These bins are easily loaded, using any current front-end loader, including the John Deere backhoe/bucket, although a mid-sized (2 1/2 yard) bucket has been found to be more efficient.

Cement is carried in a bin at the rear of the vehicle. Unless bulk cement is available, a debagging operation is required. Water is carried in a large tank located just behind the driver's cab. Small tanks located on the right side of the Concrete Mobile carry various admixtures, including air-entraining admix and accelerating admix (calcium chloride most often).

At the job site, the dry materials are conveyed to the rear, where they are combined with water and any required admixtures. Then, the materials travel up a mixing chute, where a rotating auger thoroughly mixes the concrete. Though production rates will vary with each unit, the Concrete Mobile should produce a cubic yard of concrete every two to three minutes, depending on the weight of material.



The Concrete Mobile will replace the 16-cubic-feet Concrete Mixers in most engineer units. The greatest concentration will be found in the Engineer Combat Battalion (Heavy), where three XM-919 units will replace six of the old units. XM-919s will also be allocated to the Engineer Combat Support Equipment Company (two per company), and the Engineer Port Construction Company (one per company). All other engineer units which are presently allocated the 16-cubic-feet mixers are scheduled to keep them.

Delivery date for the first XM-919s to the field is currently set for this Fall. Maintenance and operators manuals will be published and accompany the new equipment.

The XM-919 Concrete Mobile is obviously more sophisticated and complicated than the equipment it is replacing. It will be operated by a 62H20 (Concrete and Asphalt Equipment Operator). Affected unit TO & Es will be changed in the immediate future to provide slots for these operators.

Initial training of personnel will be conducted by new equipment training teams from DARCOM. Thereafter, Concrete Mobile operation will be included in the Skill Level 1 training of 62H Concrete and Asphalt Equipment Operators at Fort Leonard Wood, MO. Operation of the new equipment is to be covered in the 62H20 Soldier's Manual to be published in December.

The Concrete Mobile has proved in the civilian sector to be an excellent and dependable concrete mixer. The XM-919 will surely improve the quality of concrete produced by Army engineer units.

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THE RED LINE

Major Arthur J. Parr, Jr.

COLONEL-GENERAL S. Kh. Aganov has been Chief of Engineer Troops of the U.S.S.R. Ministry of Defense since November 1975. He discussed matters of concern to him in two articles published in the Soviet magazine, *Voennyi Vestnik* (Military Herald), within the last 17 months. The articles dealt primarily with engineer training for the period 1977-78. The following is based on my own translations of those articles.

Observing the common Soviet practice of requiring nonengineer units to perform some engineer functions, General Aganov emphasizes the importance of active participation in engineer tasks by *all* troops. He decries the tendency by young combat arms officers to rely excessively on combat engineer support to pass through or around obstacles. Briefly summarizing his stand on the subject, Aganov says, "The individual soldier of any branch must personally know how to emplace mines in front of his position, how to detour in combat around various obstacles (including artillery-delivered or aerially-emplaced mines), how to clear lanes when necessary, how to destroy mines with overlaid charges, and how to conduct reconnaissance of water obstacles and cross them from the march."

Over-reliance on qualified engineers to the point of misuse is not confined to low-level tactical units. Acknowledging that the effectiveness of training depends largely on instructor competence, Aganov points out that this does not mean that an engineer staff officer (NIS) or an engineer specialist must be the one to conduct unit-level engineer training. The NIS *organizes* instructor-training exercises for unit officers, *aids* them in preparing training areas and aids, and *conducts* exercises with those units employing live explosives and demolitions. Ultimately, of course, "teaching engineer actions to subordinates is the responsibility of commanders of units of all branches."

TURNING TO COMBAT engineer units, Aganov observes that insufficient attention is given to unit training for young officers and exercises for commanders. Too great a reliance is placed on lecture classes and training situations are too easy. Engineer actions are treated in isolation from tactical situations and are played on thoroughly familiar terrain. Troops are "babied" by not requiring the full load of individual tactical gear to be carried on exercises. Planners are employing over-simplified factor formulas and schematics for gauging work requirements, and they are not taking into account the probable enemy. Finally, the impact of more modern equipment, received through systematic replacement or updating, requires increased attention to the "skill qualifiers" of junior specialists.

Emphasis for the 1978 training year was placed on organizing and accomplishing the tasks of preparing and overcoming obstacles and barriers, and on forcing water obstacles in close cooperation with tactical units. Evaluating the year's training effectiveness, Aganov notes two significant shortcomings. Of primary importance is the apparent ignorance of the basics of combined arms combat by some platoon and company level engineer officers. They have poor knowledge of the content of their manuals and cannot quickly and correctly issue combat orders and directives. The second shortcoming, says Aganov, is that some engineer commanders and staffs lack experience in carrying out engineer missions under combat conditions. When out of touch with higher authority, they "blindly adhere to the previously-established plan."

Aganov's solution to the second shortcoming is that commanders must consider reconnaissance data skillfully, disseminate the data to subordinates in a timely fashion, and strive to be more creative in their approach to accomplishing the mission. His solution to the primary deficiency is probably more difficult to implement. He

says it is "necessary to place more trust in (junior) officers and sergeants, to encourage in every way their independence and initiative, to be demanding of them."

IN HIS CRITIQUE of the 1978 training year, Aganov comes squarely to face with what many (if not most) Western military analysts consider to be a major problem for the Soviet armed forces: an institutional lack of initiative and flexibility. For what it is worth, Aganov is not the only Soviet military author to endorse and seek greater initiative from junior leaders. *Military Herald* magazine and the *Red Star* newspaper frequently carry articles on the subject.

But wishing doesn't make it so, and Aganov himself illustrates Soviet duality in approaching the problem. He is severely critical of "blind adherence" and the unimaginative parade-ground performance of some officers and unit commanders. But when asked to explain the successes of outstanding Soviet units, his response was "detailed, scientifically-based organization and planning of training, with the main emphasis on training in the field, where there is an effort to get *strict and unconditional fulfillment* of the requirements of orders, troop regulations, lesson plans, programs and accepted Socialist obligations."

Coming full circle, Aganov states that he is certain "no unit or subunit can be outstanding if the commander holds back while waiting for prepared recommendations and fails to demonstrate initiative and independence." The problem is the choice between initiative and positive control, but what Soviet combat engineers really seem to lack is the latitude to make their own mistakes, and learn from them. The Soviets are, however, giving some attention to this matter.

TO CONCLUDE, the guidelines for the 1979 training year are as follows:

—Engineer unit officers, political officers and staffs are to bend their efforts, as always, toward constant combat readiness of engineer units, raising the level of field training to encompass more realism, greater challenge, a closer relationship to tactical situations with performance of familiar tasks on unfamiliar terrain.

"Teaching engineer actions to subordinates is the responsibility of commanders of units of all branches."

"The individual soldier of any branch must personally know how to emplace mines in front of his position, how to detour in combat around various obstacles, how to clear lanes when necessary, how to destroy mines with overlaid charges, and how to conduct reconnaissance of water obstacles and cross them from the march."

"No unit or subunit can be outstanding if the commander holds back while waiting for prepared recommendations and fails to demonstrate initiative and independence."

—Engineer staff officers assigned to non-engineer units will concentrate on training to overcome obstacles, especially mine obstacles, without specific combat engineer support.

—Combat engineer troops will attempt to master the task of engineer support of combat operations in both nuclear and conventional situations, with increased demands on the conduct of night operations at daylight proficiency levels. Crews will prepare to function independently in the most complex situations.

Major Parr is currently assigned to the Office of the Joint Chiefs of Staff as a Presidential Translator on the Washington-Moscow hotline. He was previously assigned to the Defense Intelligence Agency as a Soviet Ground Forces Analyst.

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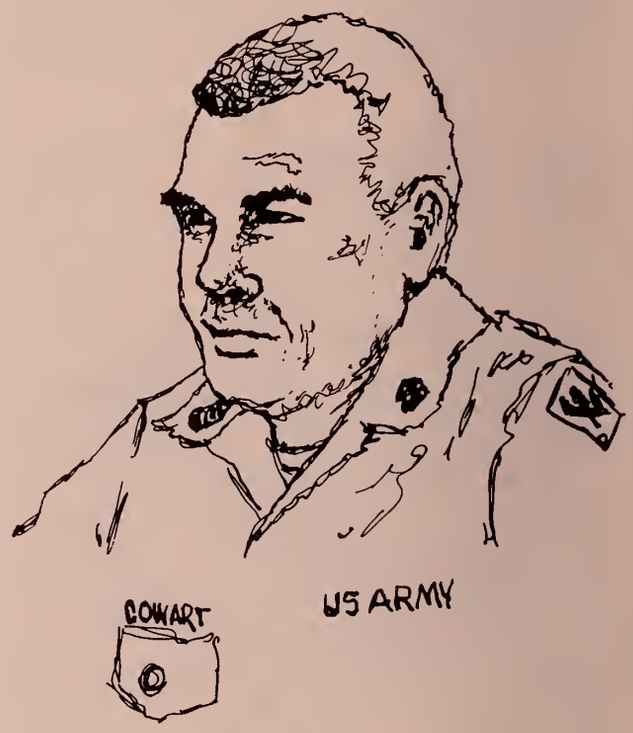
In his dual role as Command Sergeant Major of the United States Army Engineer Center and The Engineer School, CSM Lucion L. Cowart is the senior NCO responsible for the education and training development of engineer soldiers. During his 24 years of service with the Corps of Engineers, he has served in leadership positions from squad leader up to command sergeant major. He is also a graduate of many engineer technical schools, drill sergeant school, and the Sergeants Major Academy. CSM Cowart discussed some of the changes he has witnessed during his Army career and also some of the problems facing both the Corps and the Army in a recent interview with THE ENGINEER.

an interview with CSM Cowart



THE ENGINEER: Sergeant Major Cowart, your career in the Corps of Engineers spans more than 24 years. Will you comment on some of the most significant changes you have observed during that time?

CSM COWART: Of course, there have been many changes. In fact, we seem to be in a constant state of change, but I think that is as it should be. It reflects the long range planning necessary for the Corps of Engineers and the Army to remain ahead of the changing battlefield situation. There are three major changes that I'll comment on.

The recognition and designation of engineers in 1975

as a combat arm and part of the Combined Arms Team is the most significant. This change recognizes the contribution of engineers. In today's scenario of the lethal battlefield, the engineer plays a critical role as a member of the Combat Arms Team. The most important contribution he can make is to maximize the use of terrain to enhance the capability of our weapons system and to decrease the effectiveness of the enemy weapons system. The engineer focuses on how to get maximum effectiveness out of what we have through terrain reinforcement.

The second change is the orientation of engineer forces forward in the main battle area. The role of the various engineer units has changed to meet the demands of the tactical situation. For example, the role of the old construction battalion, now designated as the Combat Heavy Battalion, is one of combat engineering in the forward area of the division during the initial phase of the battle. Another example is the tactical bridging now coming into the inventory which reduces the massive manpower requirements for construction. The new bridge company constructs the majority of bridging, thereby conserving valuable engineer resources and permitting Combat Engineers to concentrate on the mission of terrain reinforcement.

A third change is the way we select and train our noncommissioned officers. When I came into the Army, you had to be expendable or in the right place at the right time in order to get a school. The soldier who really needed the school, who could make a valuable contribution to his unit upon successful completion of a school, could not go. We haven't overcome this problem entirely, but we have made considerable progress.

Today, we have a very professional NCO education system which depends upon both semi-centralized and centralized selection procedures. In the ranks of specialist and sergeant, we use semi-centralized selection procedures for schooling. For the staff sergeant, a DA centralized board makes the selections.

Our schools are oriented to the type of environment in which the soldier will fight. If he is a Combat Arms soldier, he goes the Primary NCO and Basic NCO route. If the soldier is in combat support or combat service support, he attends the Primary Leadership Course and, later, the Basic Technical Course.

Engineers do well in the Combat Arms route, but we are limited to sending only the 12B Combat Engineer to the Primary NCO Course and the Basic NCO Course. We have some courses coming on line in the Basic Technical Course, but we need more courses to provide training in the Combat Support and Service Support career fields.

The Advanced NCO Course is the last MOS technically oriented school a staff sergeant attends in his Army career. At the grade of Master Sergeant, he is considered for attendance at the Army's Sergeants Major Academy.

THE ENGINEER: Sergeant Major, what is your responsibility in the development and training of the engineer soldier?

CSM COWART: My responsibility is primarily advising and recommending a course of action. As you know, the Directorate of Training Developments is responsible to the Commandant for developing the individual training plan and follow-on supporting efforts such as Commander's Manuals, Soldier's Manuals, Skill Qualification Tests, courses of instruction, and the necessary literature and extension material. At a point in this process, I have an opportunity to submit comments and recommendations. However, since the Engineer School is responsible for 67 Soldier's Manuals in 36 MOS career fields, I don't see every document. But we have some fine engineer NCOs who are working on this.

My primary interest is the noncommissioned officer education system—how we train the squad/section leader and the platoon sergeant. This is most important since these are the NCOs who will replace the First Sergeants and Command Sergeants Major of today. The way we train and use these NCOs today determines their value to the Army in the future.

THE ENGINEER: Can you explain how the Engineer Center at Fort Leonard Wood ties in with the Engineer School at Fort Belvoir?

CSM COWART: The Engineer Training Center at Fort Leonard Wood conducts Basic Combat Training and some basic technical courses of instruction. The Engineer School is the TRADOC proponent for all engineer training, which includes most of the entry-level Advanced Individual Training at Fort Leonard Wood. There is a very close tie between the School and the Training Center. Recently the School opened a field office as an extension of the Training Development functions at Fort Leonard Wood. Fort Leonard Wood contributes a great deal of information and material to the School in its training development function. There is a spirit of cooperation between the two, and a joint development effort in most courses of instruction. I feel that both centers are working toward the same goal, which is to send the best-trained engineer soldiers possible to the field.

EDITOR: What are some of the most significant problems engineers face in the future?

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CSM COWART: The same problems we face today—insufficient training time due to peacetime construction projects, lack of training resources to train soldiers, and doing more with less. More complex equipment is coming into the field, and that certainly isn't going to make the small unit leader's job any easier, since the responsibility for training and maintenance of the equipment rests squarely on his shoulders.

THE ENGINEER: The increasing number of women joining the Army greatly concerns some of our leaders. How do you feel about it?

CSM COWART: There are going to be greater numbers of women in the Army of the future and our leadership is going to have to address the situation in logical, well-conceived programs. Of course, I feel that there are many MOSs in which women can serve and do a fine job. But I do not think the American public or the Army leadership is ready to place women in combat units.

Judging from how I see them managing their military careers, I think the majority of women coming into the Army today are really looking for a job in traditional fields for women, rather than non-traditional skills. Many apparently are electing non-traditional MOSs just to get into the Army, but few reenlist for those MOSs.

THE ENGINEER: How does the quality of today's average soldier compare to the average soldier in the early years of your Army career?

CSM COWART: I believe that the Army is a cross-section of our society and that the Army's problems reflect the problems of that society. When I entered the military service, our society was very disciplined and parental guidance was firm. But that's changed over the years. Today's youth are given more freedom to express themselves. They are not required to help on the farm or in their family business. They have more time on their hands and, of course, they are exposed today to such things as drugs that were not available when I joined the Army.

But I believe a young man or woman usually joins the military service to learn a skill and improve educational opportunities. There are always soldiers looking for an easy way to earn a living and they are the ones who cause most of the problems for today's NCOs and supervisors. Fortunately, today's Army has more soldiers who are truly interested in doing a good job than those who are trouble makers.

Overall, I feel that quality has not diminished since I first entered the service. We have good soldiers in today's Army, but we need to emphasize stronger leadership at the small unit level. That's the real challenge facing us today and in the future.

THE ENGINEER: How do you feel about the future of the Corps of Engineers?

CSM COWART: I'm very optimistic. I think the engineer soldiers we send to the field are good soldiers, but they require additional training to be fully qualified. Their skill level when they reach the field is about what it has always been. It is up to the squad/section leader to provide that additional layer of training to make them fully qualified engineer soldiers at skill level one.

New items of equipment and material coming into the inventory will assist the engineers to provide timely and valuable support to front line units, with emphasis on terrain reinforcement.

Most future training for career development of our NCOs will be through training extension courses. Every soldier cannot be trained in a service school environment, so we must recognize those who possess the initiative to enroll and complete extension courses.

Overall, I feel that engineers will continue to be a valuable asset to tactical commanders, more so today than in the past. More than ever, tactical commanders at every level need engineers to participate actively in planning as well as the execution of the battle schemes. The need for defilade positions, strong point emplacements, rapid emplacement of minefields, and obstacles plus the many other vital combat engineer missions makes the engineer the most sought after resource on the battlefield.

Integrated
Basic Training

Major Robert C. White

In July 1978, Fort Leonard Wood received the mission to conduct basic training for women. The post was given approximately two and a half months to prepare for its new mission.

Considered by itself, the assignment did not sound very imposing. After all, the Army had been conducting basic training for women for 35 years. Furthermore, Leonard Wood was a training installation. It had the most modern equipment and facilities and was staffed with trained drill sergeants and instructors.

However, a new angle expanded the task facing Fort Leonard Wood. Training would be conducted under the Basic Entry Integrated Training (BEIT) program. This meant that women would be trained with men, receiving exactly the same course of instruction as their male counterparts. It would require a concentrated preparation effort during the ten weeks before women arrived.

The only source of information about BEIT was Fort Jackson, where the concept had been tested since 1976. Information gleaned from those tests was combined with ideas developed by planners at Fort Wood to compile a list of preparations that had to be made. The list was awesome.

Billets had to be partitioned, latrine facilities changed, new items procured for sale in the post exchange (PX), barbers instructed on how to cut women's hair, and female military clothing and boots had to be requisitioned. The list could go on and on.

No less impressive were the challenges faced by personnel who would be directly involved in planning and conducting training. Male drill sergeants had to be given additional training. Since Fort Wood had no female drill sergeants, female noncommissioned officers (NCOs) had to be identified for training at the post Drill Sergeant School. Although no standards would be changed, training methods and techniques had to be modified. This list could also be expanded into a voluminous document.

Trainee at the position of "Port Arms" is tested on her knowledge of weapons

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To chronicle all preparations that were necessary would require more space than is available here. The real story lies in the results of the preparations and the degree of success of the training program.

That planning and preparation were thorough was borne out on the day that the first female trainees arrived. It was not a monumental event, but, rather anticlimatic. No flurry of frenzied activity surrounded attention to last minute details. Anyone driving around post would not have discerned that it was any different than any other day. So far, planners and logisticians had succeeded.

But the real test of success depended on how well trainers and trainees, both male and female, adapted to the new situation.

Processing at the Reception Station, with its voluminous paperwork, tests, and medical examinations, went smoothly. The women then were moved to their new home where their platoon, along with three male platoons, would form a company.

"The decision to organize one female platoon in each company, rather than dispersing them throughout the company, was made to provide integrated training, but still keep the women separate," says Colonel Beauford C. Katt, Director of Plans, Training and Security. "We did this partly to protect the females from themselves," he continued. "Otherwise, they tend to try to keep up with their male counterparts before they are ready. Such effort increases the number of physical injuries and that, in turn, hinders training.

"On the other hand," Katt says, "when the women are integrated as a unit, they tend to distract the men more readily. When a female is part of the platoon organ, she becomes accepted, one of the guys. Each theory probably has its good and bad points."

When actual training started, some of the modified training techniques and methods were implemented. For example, while women were required to pass the same physical fitness test as the men, they were brought to that degree of proficiency more slowly.

Also, the women, in general, had not previously learned to throw as well as men. To prepare them to hurl live grenades, they were given practice grenades to use during concurrent training or free time.

"Women are playing an expanding role and doing extremely well at it. They have required that we reassess what types of assignments they can fill, and now some 96 percent of our military occupational specialities are open to them. They are still barred from roles likely to involve close combat, but they have caused us to disregard the old stereotypes. They are soldiers and need to be treated as such. Their presence has leavened the whole Army and presented challenges to leaders all down the line to adjust their traditional modes of thinking."—General Bernard W. Rogers, Chief of Staff of the Army.

Many instructors noted that the women were more inquisitive than the men, particularly during basic rifle marksmanship training. One instructor attributed this largely to "male ego."

"Men," he said, "feel that they should already know about weapons and marksmanship. If they (the men) don't understand something, they are hesitant to ask in front of the women."

It was also found that female soldiers were just as interested in the "why" as they were in the "how." However, once they understood this, they made a 100 percent effort.

Two important issues were examined after some experience had been gained in integrated training. The first was how the males accepted females and the second was how the women had reacted to their training.

The answer to the first issue was positive. No grumblings were heard about favoritism to the females or that the women were not carrying their load, as some persons had anticipated. In fact, the only discontent among males concerned the amount of publicity received by the

first female platoon. As expected, the news media were interested in the initial training of the first integrated group of females. Some of the men apparently felt that if things were truly "equal," they should be able to share the publicity spotlight with the women.

The answer to the second issue was also positive—surprisingly so. Performance was good, discipline excellent, and morale outstanding. Several officers and noncommissioned officers felt that the presence of the women had a positive effect on discipline. One officer said, "I think the men make a greater effort to look good and are more conscious of their behavior with women around."

The thing that most impressed observers of the female trainees was their exceptionally high morale. However, the women pointed out that morale hadn't always been high. Their description of their first few days in the Army ranged from "horrible" to "total despair" and "what am I doing here?"

The concensus was that their initial reaction was caused by the complete change of lifestyle. They had never before been in a situation where every minute of their lives was totally controlled. Nor had they ever been required to adhere to such a rigid schedule and few had ever been subjected to such rigorous physical activity.

But after those first "terrible" days, the platoon suddenly congealed into a real team, driven by a desire to prove themselves to their male counterparts.

Finally, much of the credit for the motivation and success of BEIT at Fort Leonard Wood must go to the drill sergeants. No matter what commanders, planners, and logisticians do, success is dependent on the drill sergeants. This highly professional group of soldiers is the key ingredient that makes or breaks a training program.

Women have not taken the "combat" out of basic training

Fort Leonard Wood's drill sergeants worked hard to prepare to deal with women. Many spent a week at Fort Jackson, learning from their counterparts. They apparently learned well and applied their new knowledge with characteristic professionalism.

It would be misleading to imply that there have been no problems in Fort Leonard Wood's BEIT program. A few old soldiers probably still cringe when they hear "Jody" calls from 40 soprano voices. And, of course, a few female soldiers have not readily adjusted to the training regiment.

But, the important thing is that the program has been overwhelmingly successful without major training changes and without lower standards. Basic training is just as demanding—and rewarding—as ever.

Major White is the Public Affairs Officer of the U.S. Army Training Center Engineer and Fort Leonard Wood.

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Computer Assisted Map Maneuver Simulation 78

Major John L. Herring

THE DIVISIONAL engineer battalion for the 40th Infantry Division (Mech), California Army National Guard, is the 132d Engineer Battalion (Mech), headquartered in Sacramento, CA. Alpha and Bravo Companies of this battalion are located in Los Angeles and are under the cognizance of the Branch Assistance Team—Engineer (BAT-EN) of the Readiness Group Los Angeles, ARRIX.

During the past few years, the interaction between the 40th Division, its brigades, and the 132d Engineer Battalion (M) has been virtually nil. The Engineers were mentioned in various exercise OPORDs and OPLANs, but the Engineer Annex, Obstacle Annex, and Obstacle Overlay were usually left in the "to be published" category. This attitude prevailed for several reasons, but mostly because engineers had very little, if any, effect on the outcome of the various FTXs, CPXs, or Battle Simulation Games.

IN THE SPRING OF 1978, the 1st Brigade of the 40th Division participated in a Computer Assisted Map Maneuver Simulation (CAMMS) exercise at Camp Roberts, CA. There was no participation by the divisional engineers, but the BAT-EN, acting as the Brigade Engineers, developed an Engineer Annex, Obstacle Annex, and Obstacle Overlay to be used during the exercise. When the exercise took place, however, it was discovered that engineer play had no effect whatsoever on the outcome of the "battles," thus reinforcing the attitude that the inclusion of engineers meant a great deal of additional effort with negligible results.

In the early Summer of 1978, we learned that CAMMS

would be played for the entire 40th Infantry Division (Mech) in November. In an effort to get engineers involved, we attempted to determine how the CAMMS exercise could include engineers and provide results which made engineer play an integral part of the exercise. Telephone calls to Fort Leavenworth, Fort Belvoir, the 7th Infantry Division, and the 75th Maneuver Area Command (both of which had controlled CAMMS exercises) proved fruitless. No one knew of any method by which engineers could affect battles in the CAMMS exercise.

THE PRIMARY OBJECTIVE of the BAT-EN, upon notification of the Division CAMMS exercise, was to prove to maneuver commanders and divisional engineers that engineer participation in Division and Brigade level exercises is a necessary ingredient to the success of the exercises. Several sub-objectives were identified:

1. Develop a system for influencing battle outcomes during CAMMS which related to engineer activity.
2. Convince the Commander of the 40th Infantry Division (Mech) that the system developed should be implemented.
3. Assist divisional engineers in their role in the Active Defense.
4. Assist maneuver commanders in the planning of engineer support in the Active Defense.
5. Monitor the CAMMS exercise to determine the effectiveness of engineer activity.

THE SOLUTION to the development of a system for influencing battle outcomes was, in fact, already in the CAMMS exercise. In the Active Defense, two major areas of engineer activity are *Counter-mobility* and *Survivability*. The computer is programmed to consider Terrain Mobility and Type Defense factors in its assessment of battle outcomes. The key to engineer involvement in CAMMS lies in the ability of engineers to change the OPFOR Terrain Mobility factor and the friendly forces' Type Defense factor. The success of engineer activity hinges on the effective use of terrain, including obstacles, by maneuver commanders.

The system developed for using engineers in CAMMS involves the following precepts:

— The effectiveness of friendly firepower increases as the mobility of the enemy decreases;
— Obstacles must be covered by direct and indirect fires to be most effective;
— The selection of battle positions for the active defense should be based on the location of natural and artificial obstacles.

In effect, the obstacle system is not designed to support the maneuver plan, but is designed to be supported *by* the maneuver plan. Our effort became that of convincing maneuver commanders that not only were the engineers necessary in planning the Active Defense, but that planning should be based on engineer input.

For purposes of the exercise, we developed a simple system, which took into account the combat multiplier effect of terrain reinforcement. Simply stated, the Terrain Mobility factor of the advancing OPFOR was reduced to ten (10) (stopped) for a period of time when it encountered each obstacle, (e.g., M57 Minefield — 5 minutes., Abatis — 30 minutes., Anti-tank ditch — 5 minutes).

DURING THE BATTLE, four conditions existed:

1. If an obstacle was covered by direct and/or indirect fires and observation, friendly forces could initiate a battle when the OPFOR encountered the obstacle. If friendly forces were defending from appropriate terrain in prepared positions, the results of the battle invariably favored the defender.
2. If the OPFOR was moving across favorable terrain and if friendly forces were defending from unwooded hilltops (the old "key terrain" syndrome), the results of the battle favored the OPFOR.
3. If an obstacle was not under observation and fire (out of range, masked by terrain or vegetation), it had no effect on OPFOR mobility and could not be used as a consideration in the "battles."
4. Only obstacles described in the OPORDs of the brigades could be shown on the board, and engineers were required to have resource schedules at hand verifying that time and men/equipment resources were available to install the obstacle (NOTE: Divisional engineers were told that they could begin their efforts 72 hours prior to the start of the battle.)

DURING THE COURSE of the battle, the amount of prior engineer involvement in planning the Active Defense became very obvious. The Brigade Engineer for the 2d Brigade had spent a considerable amount of time and effort with the Brigade Commander in the earliest stages of planning. Obstacles were well integrated with the maneuver plan and the results of the "battles" were showing the effects of engineer activity.

In the 1st Brigade sector, obstacle planning had not been integrated into the maneuver plan. Obstacles were not covered by fires and had little or no effect. The failure of the 1st Brigade, compared to the success of the 2nd Brigade, served to highlight the necessity for engineer involvement from the beginning.

From the engineer standpoint, the CAMMS exercise was a tremendous success. Division, brigade, and battalion commanders now have a feel for the use of engineers in the Active Defense, while engineers of the 132d Engineer Battalion have learned a great deal about the planning process. The exercise made "believers" of all involved.

Major Herring is an Engineer Branch Advisor in the U.S. Army Readiness Group, Los Angeles.

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the Wallmeister

Captain James H. Hayes Jr.

Captain Jerry T. Mohr

MILITARY HISTORY is full of brilliant campaigns in which successful use of terrain was a significant contributing factor to victory. General Stonewall Jackson's Shenandoah Valley campaign, Field Marshall Rommel's North African campaigns, and Napoleon's Po River Valley campaign are three of the more famous examples.

Recently, terrain reinforcement by maneuver commanders has been reemphasized in light of our stated objective to win the first battle of the next war. But future victory must be accomplished against numerically superior threat forces. Wise use of the terrain, therefore, is imperative. Advising the maneuver commander on terrain analysis and reinforcement is the engineer, an invaluable member of the combined arms team.

Realizing the importance of engineers on the future battlefield, the West German Army has developed a unique organization to aid and advise maneuver commanders and their tactical engineers. It is called the Denial Engineer Organization and some of its specific duties are:

— To inspect and maintain prepared obstacles;

— To calculate obstacle ordnance required;

— To determine the location and method of attachment of ordnance to various obstacles;

— To assist engineer commanders within the NATO alliance in planning and placing obstacles;

— To cooperate and assist in preventing maneuver damage;

— To provide accurate terrain and mapping information to NATO forces.

IT SHOULD BE OBVIOUS, then, that denial engineers, known as *Wallmeisters*, can significantly contribute to the maneuver commander's knowledge of the terrain and its reinforcement.

The Denial Engineer Organization indirectly originated in 1948, when Allied occupation forces in Germany began to prepare obstacles which, if executed, would have had severe repercussions on the civilian

populace. Preparations met with strong criticism by the German public, whose memories of scorched earth policies during World War II remained vividly painful. The German government, therefore, endeavored to obtain a degree of influence over preparation and employment of such obstacles with the goal of preventing complete destruction of the territory of the Federal Republic of Germany in the event of another war.

UPON RATIFICATION of the Forces Convention of 1953, Germany was given the responsibility of constructing installations to serve the defense purpose, including the construction of prepared obstacles. When West Germany regained its sovereignty and became a member of NATO in 1955, it regained the right to participate in defense planning.

Subsequent agreements and memorandums designated working relationships between various NATO commands and the German Territorial Defense Command, which was established to coordinate defense activities. It soon became apparent that the shear volume of work necessitated a specific agency within the Territorial Defense Organization to handle the planning and preparation of obstacles. So, in February 1957, the Denial Engineer Organization was officially formed.

At its lowest level of operation, the organization consists of three-man teams which are responsible to a Denial Engineer Group. The Group, in turn, is responsible to the Military Region Command, which is responsible to the Military District Command, which answers directly to the Territorial Defense Command. But NATO maneuver commanders and field engineers are primarily interested in the three-man Wallmeister teams.

WALLMEISTER team members are all engineer sergeants major in the West German army. They maintain a wealth of information on file, including target folders of all prepared obstacles and locations of all munitions bunkers within their specific sectors. They provide tactical engineer units within their sector a copy of each prepared obstacle.

Each Wallmeister team is responsible for a specific area or sector, which is determined by distinct political boundaries. A sector may overlap tactical unit boundaries, which may include parts of several Wallmeister sectors.

Prepared obstacles include variations of three basic types: prechambered shafts in road and bridge abutments; prechambered compartments or racks in bridges; and tumble-down block obstacles. Prechambered shafts are similar in appearance to sewers. Their covers are distinguished from sewer covers by a nut and stud in the center of each cover. They are usually located on roadways in hilly terrain.

PRECHAMBERED bridges are bridges which contain a compartment or rack to house explosives, while tumble-down block obstacles are triangular concrete shells formed in a column filled with reinforced concrete. The latter rests on a concrete foundation that has an empty horizontal shaft designed to receive a cylindrical explosive.

Upon detonation, gravity pulls the column down on the roadway, imbedding the road with spikes to form an excellent antitank obstacle.

In order to assist the maneuver commander in formulating his battle plan, a unit engineer must first locate all prepared obstacles within his tactical area. If he discovers a deficiency in the number of obstacles or their location, he may coordinate with the appropriate Wallmeister team or teams in requesting the construction of new prepared obstacles.

Next, the engineer must locate all demolition storage bunkers in his tactical area. Storage bunkers house German demolitions commonly referred to as "cheesecake charges," specifically designed to fit the cylindrical prechambered shafts. Explosives for the remaining prepared obstacles must be furnished by the engineer emplacing unit.

FINALLY, the engineer must obtain information from the Wallmeister's file which can aid him in structuring the battlefield by means other than explosives and which may deny specific items from potential enemy control. The Wallmeister's file (Hilfspuellen) contains such information as the locations of electrical generators and transformer stations, telephone junction points, aircraft runways, waterworks, engineer equipment parks, lumber mills, quarrys, asphalt plants, and many other items of tactical significance.

All of the above information, in conjunction with ground reconnaissance, can be useful to the engineer in his development of a denial target list, which is prepared with the objective of preventing potential enemy use of allied material and equipment. It could prove invaluable to the maneuver commander engaged in the active defense.

It should be obvious, then, that the Wallmeister organization represents a great asset to the NATO maneuver commander in Germany. Used wisely, the Wallmeister organization is an added combat multiplier to the combined arms team.

Captains Hayes and Mohr are attending Engineer Officer advanced Course 2-79 at the U.S. Army Engineer Center and Fort Belvoir. Both have served tours as company commanders of engineer units in Germany. Captain Hayes with the 9th Engineer Battalion and Captain Mohr with the 82nd Engineer Battalion.

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SQT and ARTEP Feedback

ONE OF THE KEY FEATURES of the SQT is the feedback provided to the field as well as to test development agencies. The first results produced by the system are the individual Soldier Reports (ISR). The goal is for each report to be sent to the soldier within 30 days after the test is completed. Present feedback time is not as immediate as planned for in the future.

The ISR tells the individual the number of scorable units rated "60," "NO GO," and "NOT OBSERVED" and gives a total percentage score. Based on the score, the report tells the soldier if he verified or failed to verify his present skill level, or if he qualified for the next higher skill level. Most importantly, the report lists those tasks scored "NO GO" by task number. The individual can match up the number of the missed task on the report with the same task number in his Soldier's Manual, and can practice the task until it is mastered.

The responsibility for "boning up" on a task does not end with the individual. The company commander also receives a copy of the Individual Soldier's Report and, as several of these cross his desk, he may find that a problem task exists in his company which needs attention. He can assign an NCO to train those individuals until they meet performance standards.

CMF	MOS	SOLDIER SKILL LEVEL	SQT ADMINISTERED	FIELD DIST OF SM	INITIAL SQT TEST DATE
12	12B	1	2	JUL 78	JAN 79
		2	3	JUL 78	JAN 79
		3	4	JUL 78	JAN 79
	12C	1	2	JUL 78	JAN 79
		2	3	JUL 78	JAN 79
		3	4	JUL 78	JAN 79
	12E	1	2	JUL 78	JAN 79
		2	3	JUL 78	JAN 79
		3	4	JUL 78	JAN 79
	12F	1	2	JUN 80	OCT 81
		2	3	JUN 80	OCT 81
		3	4	JUN 80	OCT 81
29	35E	1	2	JUN 79	DEC 80
		2	3	JUN 79	DEC 80
		3	4	JUL 80	DEC 81
	41B	1	2	DEC 80	JUN 81
		2	3*	DEC 80	JUN 81
	41K	1	2	MAR 81	SEP 81
		2	3*	MAR 81	SEP 81
	51B	1	2	JUN 79	DEC 79
		2	3*	JUN 79	DEC 79
	51C	1	2	JUN 79	DEC 79
		2	3*	JUN 79	DEC 79
	51G	1	2	MAR 79	SEP 79
		2	3*	MAR 79	SEP 79
	51H	3	4	JUN 79	DEC 80
	51M	1	2	DEC 78	JUN 79
		2	3	DEC 78	JUN 79
		3	4	DEC 78	JUN 79
	51N	1	2	MAR 79	SEP 79
		2	3*	MAR 79	SEP 79
	51R	1	2	MAR 79	SEP 79
		2	3*	MAR 79	SEP 79
	81B	1	2	MAR 79	SEP 79
		2	3*	MAR 79	SEP 79
	51T	3	4	MAR 82	SEP 82

AFTER THE END of the test period, the company commander gets an additional aid for determining training deficiencies within his company in the form of a company commander's report. This report is in two parts. The first lists SQT scores by individual, and the second identifies training problem areas within the company by task. When combined with the ISR, the commander can identify those individuals who are deficient in a certain area and assign resources to correct performance. Thus, for the first time, the Army has a system which permits carefully planned allocation of limited training resources.

Recognizing that responsibility for training management does not end at the company level, the SQT reporting system continues up the chain of command, giving an ever-increasing macroview of problem areas in its companies. No longer are individuals mentioned, but task deficiencies still appear. If commanders above battalion level choose to see the results of their subordinate units, they will receive a report listing units with deficiencies. Again, this permits commanders to identify a problem area and zero in on those tasks causing the problem.

Feedback of test results is not limited to the field. Each test development agency will receive a complete item analysis for every question it has developed, to include percentages of people failing and passing a scorable unit, all questions within a scorable unit, and all responses to a question. These reports are forwarded after the end of the test period. A safety valve, called an intra-quarter item analysis, to identify inadequate items which may have slipped through validation, will be used to prevent a soldier from being penalized by a systems error. Essentially, the analysis samples input from many geographical locations and types of units and identifies faulty items.

THE SQT is, of course, linked with the personnel management system, so an individual's scores will affect his promotions. The report sent to the personnel community will provide data for rank-ordering purposes. The tie to the promotion system should serve as a motivator for the soldier, and test results should provide the Army with a reliable indicator of performance not always available when an individual has nothing at stake. The ultimate worth of the SQT will be measured by increased individual proficiency as evidenced by the soldier and unit reports.

Training management by no means ends with the SQT. The SQT focuses only on individual proficiency, which is the foundation for the collective proficiency necessary to fulfill the unit's mission. Collective proficiency is measured by the Army Training and Evaluation Program (ARTEP), which tells the commander where he should focus resources to improve team, company, and battalion performance.

But unit evaluation does not end with SQT reports or ARTEP results. Training management should include comparing results of ARTEPs, particularly those of the Sub-Unit Evaluation (SUE), and SQTs.

FOR EXAMPLE, an individual soldiers' report may show that a soldier failed three tasks relating to the electrical priming of a demolition block. On the other hand, ARTEP results may show that the soldier performed those tasks satisfactorily on a SUE. The inference may be that one or more individuals "covered" for the deficient soldier and, therefore, the squad passed.

Or, perhaps several squad members failed all or part of those three tasks, and the squad still passed. In the latter case, it might be assumed that a strong squad leader actually performed the tasks himself or told squad members precisely how to do them. While such action may solve an immediate problem, it hurts unit performance in the long run. The person who takes over the job of squad leader, the person who is eventually promoted, must be able to perform efficiently. If his skills are deficient, he will fail to execute the mission of demolition.

THE TRAINING MANAGER, from E-5 up, must emphasize individual task performance, including supervisory duties. In the case of the team chief who is a one-man show, the manager must reiterate the chief's responsibilities to train his people to perform as a team.

The training manager must also be alert to other evaluation discrepancies. For example, soldiers may do well on their SQTs, but collectively fail the team's SUE. In this case, the answer may be the management/leadership of the team chief.

The training manager should first look at the team chief's ISR. What are the areas of deficiency? Are they the same as those noted during the

CMF	MOS	SOLDIER SKILL LEVEL	SQT ADMINISTERED	FIELD DIST OF SM	INITIAL SQT TEST DATE
29	00B	1	2	JUN 79	DEC 80
		2	3	JUN 79	DEC 80
		3	4	JUN 79	DEC 80
	82B	1	2	MAR 79	SEP 79
		2	3*	MAR 79	SEP 79
	52C	1	2	SEP 79	MAR 80
		2	3*	SEP 79	MAR 80
	52D	1	2	SEP 79	MAR 80
		2	3*	SEP 79	MAR 80
	52E	2	3	JUN 79	DEC 80
		3	4	JUN 80	DEC 81
	62B	1	2	SEP 78	MAR 79
		2	3	SEP 78	MAR 79
		3	4	SEP 78	MAR 79
	62E	1	2	DEC 79	JUN 80
		2	3*	DEC 79	JUN 80
	82F	1	2	DEC 79	JUN 80
		2	3*	DEC 79	JUN 80
	62G	1	2	MAR 80	SEP 80
		2	3*	MAR 80	SEP 80
	62H	1	2	MAR 80	SEP 80
		2	3*	MAR 80	SEP 80
	62J	1	2	DEC 79	JUN 80
		2	3*	DEC 79	JUN 80
	62N	3	4	DEC 81	JUN 82
	81C	1	2	SEP 80	MAR 81
		2	3	SEP 80	MAR 81
		3	4	SEP 81	MAR 82
	82D	1	2	DEC 80	JUN 81
		2	3	DEC 80	JUN 81
		3	4	JAN 82	JUN 82
	83E	1	2	MAR 81	SEP 81
		2	3*	MAR 81	SEP 81
	83F	1	2	MAR 81	SEP 81
		2	3	MAR 81	SEP 81
		3	4	JAN 82	JUN 32

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ARTEP? If so, is the supervisor doing his job in training the team chief? If the areas of deficiency do not appear to mesh with the SQT results, what recommendations should be made to The Engineer Center to improve the SQT, the ARTEP, or both?

Whether it is the SQT, the ARTEP, or the SUE, training management must focus its attention on preparing soldiers both as individuals and as part of a whole to accomplish the unit mission. Feedback is an indicator of how well management is doing just that.

SKILLS QUALIFICATION TESTS began in January for soldiers holding MOSs in Career Management Field 12 at skill levels 2, 3, and 4. Soldiers Manuals for the MOS 12B series were distributed last year.

Testing for soldiers holding other engineer MOSs will take place from now through September 1982. Soldiers should receive their test notice no later than 60 days prior to their test date. Notices contain information about what will be covered on a test and how each task will be graded. Task numbers on the SQT notice correspond to the same tasks in the Soldiers Manuals.

The adjacent chart reflects the current status, by MOS and skill level, of Soldiers Manuals and Skill Qualification Tests. It does not reflect Skill Level 5 tests since none have been programmed at the present time.

This article was adapted from a similar article written by Major Rob Wiltshire which appeared in the Winter 1979 edition of THE ARMY COMMUNICATOR, the professional journal of the Signal Corps.

Commanders' Update

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LTC JOSEPH P. KISH
16th Engineer Battalion
USAREUR

LTC KENNETH W. MCCOLLISTER
19th Engineer Battalion
Fort Knox, KY

LTC PAUL Y. CHINEN
27th Engineer Battalion
Fort Bragg, NC

LTC PAT M. STEVENS, IV
30th Engineer Battalion
Fort Belvoir, VA

LTC HENRY T. BROWN, JR.
39th Engineer Battalion
Fort Devens, MA

LTC JAMES A. VELEZIS
44th Engineer Battalion
8th US Army, Korea

LTC WILLIAM G. KOSCO
65th Engineer Battalion
Hawaii

LTC JAMES W. DUNMYER
76th Engineer Battalion
Fort Meade, MD

LTC CHARLES E. EVANS, JR.
94th Engineer Battalion
USAREUR

LTC STEPHEN C. MATTESON
237th Engineer Battalion
USAREUR

LTC WILLIAM A. MILLER
547th Engineer Battalion
USAREUR

LTC ARTHUR S. BROWN
548th Engineer Battalion
Fort Bragg, NC

LTC JOHN H. CAMPBELL
549th Engineer Battalion
USAREUR

LTC JAMES P. OPPENHEIM
559th Engineer Battalion
USAREUR

LTC WILLIAM D. POYNTER
563rd Engineer Battalion
USAREUR

LTC DANIEL R. CLARK
649th Battalion (TOPO)
USAREUR

EDITOR'S NOTE: This list includes only commanders of active engineer units, battalion size and larger, who have assumed command of their respective units within the last six months.

FTX
"CERTAIN SHIELD"

The following articles present key elements of the story of the combined engineer team functioning as part of the combined arms team on the European battlefield during REFORGER 78 and, specifically, FTX Certain Shield. For the engineers of V Corps, it provided literally a "first" in terms of magnitude, interoperability, and direct involvement with other elements of the combined arms team on a large scale.

The engineers of V Corps and CONUS proved their ability to successfully meet the challenge of combined arms support and also the complexities of the integration of the combined engineer team. V Corps had not previously encountered the quanity of engineer capability available to provide required support. This necessitated complex staff action from company level through Corps Headquarters. It was truly a professionally educating experience for the entire combined arms team. We, the engineers of V Corps, have a sense of real pride in the demonstrated abilities of our engineer soldiers, staffs, and those we supported during FTX Certain Shield.

Although we made many mistakes, hard work and detailed planning made Certain Shield a resounding success. We and our supported units have learned from our successes and mistakes and have utilized them in the establishment of training objectives for the future. We also learned the requirement for new doctrine and for substantiating the doctrinal needs previously identified by VII Corps during REFORGER 77.

It is a challenge to all engineers to convert lessons learned in doctrinal, procedural, and equipment areas from words into actions, so that the combined engineer team can, in fact, fully support the combined arms team. Simply stated, ESSAYONS must be more than just a slogan.

COLONEL THOMAS M. MCCLELLAND
Commander, 130th Engineer Brigade, V Corps

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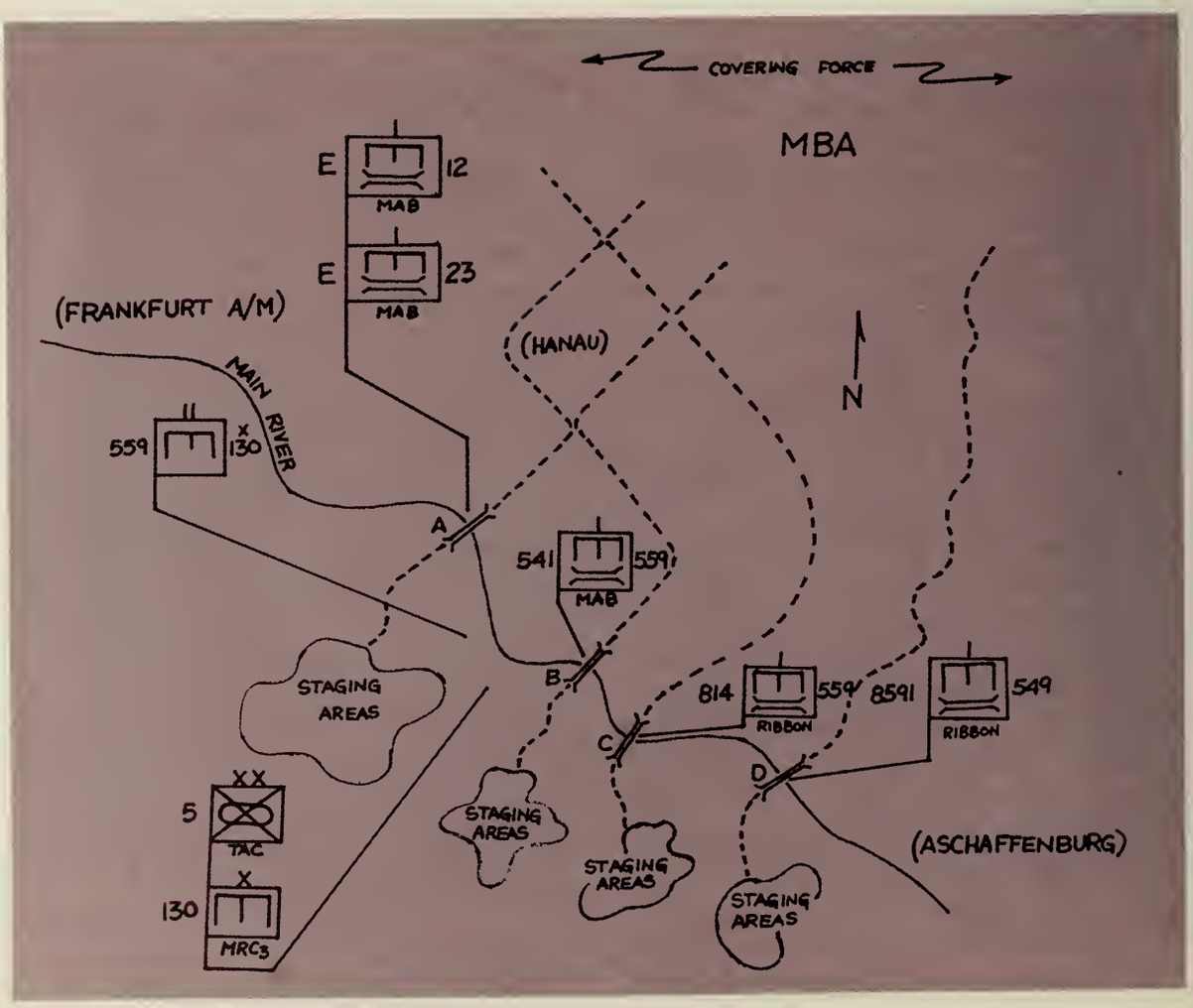
The Main River Crossing

Major Russel J. Barber

Blue Force engineers crept from their camouflaged positions at precisely 2100 hours on 17 September—a moonlit, damp, and silent night. Four minutes later, the first Mobile Assault Bridge (MAB) bay slipped into the Main River at Site Bravo and its gull-like wings immediately began to open. Simultaneously, the Red Devils of the 5th Infantry Division (M) began moving from positions in camouflaged staging areas south of the Main River.

Within 16 minutes, a mobile assault bridge (MAB) of 16 bays was constructed at Site Bravo. A similar MAB was constructed within 18 minutes of Site Alpha. At Site Charlie, an 18-bay ribbon bridge was constructed in 30 minutes. By 2145, the fourth and final bridge, a ribbon, was in position and the advanced guard of the Red Devils had begun their movement to contact across the river.

All bridges had been emplaced under radio silence and blackout conditions. In under eight hours, the entire Blue Force consisting of the Red Devils, a brigade from the BAOR (Task Force Delta), and support units had crossed the river. In under eight hours, more than 2,000



vehicles, including almost 1,000 tracks such as the M60 and Chieftain tanks, had crossed the Main River and cleared the metropolitan Hanau area. The largest single engineer-related operation in recent V Corps history had been completed safely, efficiently, on time, and without major incident.

Prior to Certain Shield the ability of the MAB to handle a high volume of continuous traffic was questionable. But Certain Shield proved that the MAB can cross, with service lights, between 180 and 200 vehicles per hour. Even the British Chieftain, which is wider than the M-60 tank, crossed at the rate of 180 vehicles per hour.

When darkness lifted and the ground fog cleared, it was obvious that the Main River Crossing had been an unqualified success. Certain Shield had been launched with a spectacular demonstration of engineer river-crossing prowess.

Major Barber was the Assistant S-3 of the 130th Engineer Brigade, V Corps, during REFORGER 78.

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TOPO support

Major David Lexa

IF COMMANDERS and staff planners were asked to identify the most important task performed by engineers, their answers would probably not include topographic support. If, however, the same group were asked to identify the first step in formulating a tactical plan, it is very likely that "analysis of the terrain" might be the most popular reply. For it is, indeed, the natural configuration of the land and the man-made structures upon it which primarily determine the course of every phase of military operations, be it tactical deployment, fire support, or material resupply.

Although the Corps of Engineers is more commonly associated with bridging and obstacle emplacement, one of the most vital engineer tasks is the accurate analysis and visual portrayal of the terrain. This task took on particular importance during CERTAIN SHIELD, since many participating units conducted operations in totally unfamiliar surroundings.

TOPOGRAPHIC support for FTX Certain Shield was provided by the 649th Engineer Battalion's 517th Terrain Detachment, the 524th Engineer Company (Topographic) from Fort Hood, TX, and Great Britain's 14th Topographic Squadron. Members of these units were organized into three tactical topographic teams, each capable of providing a full complement of terrain analysis, cartographic support, and field printing services.

Teams were placed under the operational control of the Blue and Orange Forces and V Corps Headquarters. Operating from vans and trailers, teams were co-located with their supported force's command post, and placed under staff control of the division/Corps Engineer.

From the very outset of the exercise, the workload of the topographic teams was demanding. The initial demand was for products to supplement the standard and special maps issued previously, which would facilitate the deployment of maneuver forces to the exercise area and familiarize them with general characteristics of its terrain. These early products covered high-speed movement routes, potential choke points, underpass data, drainage patterns, location of key terrain, and identification of builtup areas.

AS THE EXERCISE progressed and the tactical situation developed, the teams were tasked to provide more in-depth information, tailored to the needs of individual commanders. Typical products developed during this period were detailed river-crossing site studies, identification of airmobile landing zones, soil and slope analyses, and potential enemy avenues of approach.

In addition, the teams reproduced standard map sheets as original stocks were depleted and printed a variety of tactical overlays and operations orders from originals provided by the requestor. Throughout most of the exercise, the topographic teams were preparing several products concurrently, and the tactical situation often dictated that they be completed in hours. The pace was hectic and the work demanding. Without exception, however, the information provided was comprehensive, accurate, concise, and understandable.

CERTAIN SHIELD demonstrated that topographic support is vital to the planning and execution of military operations. The volume and variety of requests for topographic products during the exercise confirmed that commanders or staff planners must have access to current, accurate information which allows them to "see" the terrain prior to and during the battle. Engineer units whose mission it was to provide that support demonstrated their readiness to respond.

Major Lexa was the Intelligence Officer for the Assistant Corps Engineer Office, V Corps, during REFORGER 78.

Interoperability

working with our NATO allies

CPT Edward F. Smith and LT James Quale

IF THE OPPORTUNITY for American Combat Engineers to integrate with the combined arms team is rare, the opportunity to work side by side on the battlefield with NATO allies is even more rare. Certain Shield provided such an opportunity and, from the beginning, every effort was made to capitalize on it.

British Engineers from Task Force Delta's 39th Field Squadron (BAOR) were part of the initial Certain Shield task organization. Task Force Delta was placed under the 5th Infantry Division (Blue Forces) and kicked off Certain Shield as a part of Blue Forces deployment across the Main River. As the Task Force moved into initial defensive positions, D Company, 54th Engineer Battalion, fell back and began providing direct support to the 39th Field Squadron.

Aside from initial differences in jargon, the incompatibility of radios and the differences in mobility (British tracks and American 5-ton dump trucks) presented formidable obstacles to a smooth-working relationship. Despite the problems, U.S. and British engineers were able to install terrain reinforcing positions backed up by an extensive M57 mine field that ultimately halted the Orange Force advance north of the Kinzig River Line. In the Blue offensive phase of Certain Shield, this Allied engineer force supported the initial counterattack across the Kinzig River Line and was able to provide the full range of engineer combat support without interruption.

A CLOSE RELATIONSHIP developed between British and American soldiers. Sharing common experiences with an ally is always rewarding, but both soldiers and leaders now have a new appreciation for the unique strengths each organization has derived from its common heritage.

The 130th Engineer Brigade's 317th Engineer Battalion requested and gained approval to add elements of the 310th Pioneer Battalion, a unit with which they share a continuing partnership program, to the task organization. The 310th Pioneers deployed with 30 meters of medium girder bridge, an added bonus since the 130th was scheduled for issue of the MGB subsequent to Certain Shield.

During a pre-deployment exercise, the 317th and 310th Battalions capitalized on the opportunity to rotate American squads through MGB training and German squads through training on U.S. radios, mine detectors, and demolitions. Members of both units learned to field strip and clean the other's weapons and the Germans became acquainted with their host unit's crew-served armament.

During Certain Shields' Orange offensive phase, these Allied engineers were employed well forward installing fixed bridging and reducing obstacles. During the Orange defensive phase, the Bundeswehr engineers participated in target preparation, turnover, and even execution. In one particular instance, an American engineer platoon, with a German squad attached, directly confronted a Blue force of British Chieftain tanks.

WALLMEISTER teams from the German Territorial Southern Command's Military District IV (WBK IV) completed Allied engineer participation in Certain Shield. For the uninitiated, a Wallmeister team consists of two Bundeswehr senior combat engineer noncommissioned officers and is the best reconnaissance source for local terrain. Each team, as a minimum, possesses decades of experience and extensive engineer reconnaissance reports at its fingertips.

Have a question about the structural elements of a particular bridge? Need a key to a prechambered target? Are the roads on a particular map properly located? The Wallmeister team has the answer and it is policy in the 130th Engineer Brigade to include a Wallmeister team as a part of every Engineer headquarters during all major field exercises.

Certain Shield saw Wallmeisters doing everything from maintaining close contacts with Burgermeisters, police, and other local authorities, to providing current terrain—related information such as engineer resource locations, current status of roads and bridges, and possible crossing and ford sites for assault river operations. Often, as maneuver commanders studied alternative avenues of attack or counterattack, the opinion of the Wallmeister was sought and weighed heavily on the final decision. The Wallmeisters have proved repeatedly/that they are a highly professional and valuable part of the NATO alliance.

FEW, IF, ANY, combat engineers have had the opportunity to support maneuver elements of the Belgian Army. During Certain Shield, a Belgian mechanized infantry unit, the 1st Cycliste Battalion, was attached to Blue forces. A platoon of C Company, 54th Engineer Battalion, was ultimately placed in direct support of this unit. Initial plans were to place each squad in direct support of a Belgian troop, thus permitting the Belgian troop commander to jointly plan obstacles with his supporting American engineer squad leader. The battalion command post would integrate their plan into an overall obstacle plan. Because of foreign military sales considerations, however, American squads could not receive rations or fuel support from Belgian troops. Instead, they had to rely on their own unit for messing support. This required that squads be pulled off targets to a central point for feeding. Eye-to-eye contact was, therefore, lost with the troop commanders.

The initial plan was aborted and the platoon was directed to targets from a central battalion CP location. The Belgian commander or S3 would pass instructions to his supporting engineers in English on the Belgian net. The remainder of radio communications continued in French, which made monitoring the battle extremely difficult. Ultimately, the Belgian battalion commander assigned an assistant S3, fluent in English, to the American platoon.

Certain Shield provided many opportunities to practice interoperability and provided American engineers with a wealth of lessons learned. Most significant were the obvious language problems and the incompatibility of communications hardware. American engineers, however, came away from Certain Shield duly impressed with the fact that our Allies actually do practice similar doctrine with respect to terrain reinforcement, obstacle planning, and target turnover.

More importantly, American engineers gained great respect for the training and professionalism of their NATO partners.

Captain Smith was the Commander of D Company, 54th Engineer Battalion, 130th Engineer Brigade, V Corps, during REFORGER 78.

Lieutenant Quale was assigned to C Company, 54th Engineer Battalion, during REFORGER 78.

Transportation

engineers provide new asset to V Corps inventory

CPT M. Bruce Elliott and LT John Snow

THE TERRAIN and watershed system throughout the V Corps area of operation restricts the employment of float bridging assets to the Main River. Once a float bridge is downloaded, the remainder of the transporters can be made available to augment Corps transportation capability. Certain Shield exercised this concept and the lessons learned are invaluable.

The 814th Engineer Company reorganized to haul cargo upon completion of the Main River Crossing. Approximately 15 transporters were retained in reserve, while the remaining 40 trucks were reorganized into two 20-truck platoons with a single-lift capability of 360 tons. Due to limited assets available in the company and the requirement to retain the capability of relocating the float bridge, these platoons were by no means self-sufficient. Only trucks, drivers, and a convoy commander were provided.

It was this organization, then, that was placed OPCON to Brigade Headquarters. The V Corps G-4, G-3, and MCC were informed of the capability. Users were required to provide all classes of supply and service support, the Corps determined haul priorities, and even such elementary items as tie-down straps and cribbing were provided by users.

THE MAJOR shortfalls of this concept stemmed from command, control, and communications. With the haul mission, effective communications were achieved only through use of commercial telephone lines. Truck platoons often arrived in forward support areas, where they were directed by senior area commanders to subdivide and move the loaded supplies further forward. The end result, after the first iteration, was that 40 trucks were scattered throughout a dynamic maneuver area with no viable means of communication and no capability for self-support.

A related problem was the requirement for tough, substantive decisions regarding priorities for haul missions. The initial thought was to take a parochial stance and use the trucks for engineer Class V and barrier materials. This plan was soon rejected, since it failed to reflect overall Corps priorities. Even if Class V materials were isolated as the priority requirement, the problem still remained. What goes first? Artillery ammunition? Tank ammunition? Land mines and demolitions?

Maneuver commanders chose priorities, quickly recognized the value of the additional assets, and aggressively sought application of them to fulfill their requirements. Ultimately, Certain Shield saw the 814th Engineer Company move 5,886 short tons of ammunition and barrier materials, reposition some forward ammunition supply points, and travel 50,000 major break-down-free miles. Engineers again made a unique and invaluable contribution to the battlefield and provided a new asset to the V Corps inventory.

Captain Elliott was the Commander of the 814th Engineer Company, 130th Engineer Brigade, V Corps, during REFORGER 78.

Lieutenant Snow was assigned to the 814th Engineer Company, 130th Engineer Brigade, during REFORGER 78.

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Maneuver Damage Control

making wrongs right

In Western Europe, an increasing number of military maneuvers are taking place in the countryside rather than in Major Training Areas. This is a result of the increased maneuver area required to properly exercise deployed units. It places a greater burden on civilians of the host nation, who suffer crop and property damage caused by overland and tracked vehicle traffic. The manner in which the guest nation redresses these grievances determines the attitude of the local populace toward American soldiers and units.

Captain Scott Ford

It's four in the morning and the phone rings. "Maneuver Damage Subcenter Alfa. May I help you, Sir?" "A jeep in a tree? Where?" A typical day has begun for Maneuver Damage Control during Exercise CERTAIN SHIELD.

The caller might have said: "There's five kilometers of mud from tanks coming out of the field. You need to clean it up." Or "There's a tank in my yard." Or "A tank ran over my car. It's now two feet high!" These are actual examples of maneuver damage witnessed by Alfa Company, 547th Engineer Combat Battalion, during REFORGER Exercise CERTAIN SHIELD from 12 September to 8 October 1978.

Alfa Company was one of five companies operating a Maneuver Damage Subcenter (MDSC) under control of the Maneuver Damage Control Center (MDCC), tasked to the 559th Engineer Battalion for REFORGER 78. Alfa Company operated Subcenter Alfa out of the Nidda Stadt Fire Station in the Lahn-Dill-Wetterau area north of Hanau.

MDSC-Alfa was responsible for 6,000 square kilometers. Maneuver Damage Subcenters processed damage claims for small dollar amounts, provided spot reports for claims validation, monitored troop movement, and provided reaction teams for street cleaning and removal of other safety hazards.

During the exercise, MDSC-Alfa reported 1,450 incidents of maneuver damage, responded to 15 vehicle-related accidents, and filed approximately 300 claims with the Defense Cost Agency. This amounted to nearly 40 percent of the total maneuver damage reported to the MDCC.

Major functional areas of MDSC-Alfa, typical of all MDSCs, were as follows:

a. Nine field teams consisting of four men, a quarter-ton truck, street-cleaning materials, and an AN/VRC-46 radio;

b. Two squad-size reaction teams, with a five-ton dump truck capable of handling large-damage problems;

c. One heavy equipment section, including a water truck, two D-7 dozers, two 1-ton trucks with lowboy, two scoop loaders, and a grader;

d. A five-man operations center controlling field

teams, with a liaison to the Area Coordination Center (ACC) monitoring troop movement within the maneuver area;

e. A Bundeswehr non-commissioned officer serving as a translator;

f. Defense Cost Agency representatives who processed small claims.

MDSC-Alfa was fortunate in having its headquarters located at the new Nidda Fire Station. Volunteer fire department personnel, specialized equipment, and members of the German Red Cross were on-site and rapidly available for combined assistance during accidents.

MDSC-Alfa operated continuously during REFORGER 78 with two shifts. During daylight, nine field teams compiled spot reports of troop movements and maneuver damage, notified property owners of damage, and cleaned up within their capabilities. The reaction teams and heavy equipment section assisted when damage was beyond the field teams' capabilities.

Types of damage which the reaction and heavy equipment teams responded to were large POL spills or mud carried onto roads by track vehicles. Defense Cost Agency personnel were available during the day for processing of small claims within the fire house.

Troop movements were monitored and recorded by the Area Coordination Center, with information forwarded from unit umpires. A liaison from the MDSC recorded information from the ACC to forecast troop movements and consequent maneuver damage, and to keep a historical account of movements for potential claims adjustments.

Night operations compiled spot reports from field teams for forwarding to the MDCC, updated the record of troop movements in the area from ACC information, and answered phone calls from the local populace. Reaction and field teams were on call at night in case of emergencies and accidents.

One type of call from local residents became very familiar to the night crew. It was published in the local newspaper that MDSC-Alfa monitored troop movements and many locals called to find out whether their sleep would be disturbed by convoy movements.

Community relations were an important part of Maneuver Damage Control. Units which had been briefed about maneuver damage did little damage. The Fifth Infantry Division and the 5th Guards from England, in particular, showed remarkable control. Field teams from

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MDSC-Alfa made a very positive impact on the local farming community and the unit's relationship with the town of Nidda was exceptional.

The town liaison publicized REFORGER activities through the local newspapers and MDSC-Alfa did much to publicize its own presence. Every morning, the unit made a run through the streets of town. Daily physical training generated interest among the young people of Nidda, who challenged MDSC-Alfa to a basketball game. The town liaison coordinated the use of engineer heavy equipment for municipal projects when time was available. Projects included the leveling of four sanitary land fill areas, extending a sportsplatz, and reconstructing five kilometers of forest trail.

As Certain Shield wound down, a banquet was held at the firehouse. Members of Alfa Company, fire department personnel, and other Nidda citizens attended. A number of plaques and certificates were presented and Herr Echard, the town mayor, commented, "No one should live again with the roof of his home gone or the walls blown away. REFORGER and other exercises we see may cause property damage, but they make us ready. That is the only way we can be sure it doesn't happen again."

Captain Ford was the Commander of A Company, 547th Engineer Combat Battalion, during REFORGER 78.

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engineers earn

RESPECT

Major Clinton W. Willer

An exercise which places approximately 6,500 engineers on the battlefield as part of the combined arms team has great potential for success. REFORGER 78 was no exception. FTX Certain Shield proved to be the best training opportunity for V Corps combat engineers in recent history. Elements of eight battalions and six separate companies participated. Every engineer unit in V Corps participated, along with engineers from 3rd German Corps, the British Army of the Rhine (BAOR), CONUS, and the 18th Engineer Brigade.

It was recognized from the beginning that somewhere, sometime, someone would relate the Certain Shield experience to real world problems. Now it happens every day. Some form of the following statement echoes throughout every engineer unit in V Corps: "Well, during Certain Shield we did it this way—."

There is much to relate to. More than 1,300 terrain reinforcing obstacles were constructed and turned over or executed during the FTX. More than 1,000 of these obstacles were neutralized. Almost 300,000 gallons of potable water were produced. Over 9.5 kilometers of minefields were constructed by the M57 mine layer. Almost 360 feet of double single Bailey bridge were constructed. Two medium girder bridges were constructed. Eight M4T6 fixed spans were constructed and prepared for aerial delivery. More than 85 existing bridges were prepared for destruction. More than 100,000 dump truck/ribbon bridge truck miles were logged in support of V Corps haul missions. A MOMAT sand overlay road of 161 meters was constructed during hours of darkness to support the Main River Crossing. Engineers built helipads, POL facilities, tent pads, and tank ditches.

In all this, the most significant activity for engineers was the opportunity to participate and interact with the combined arms team on the European battlefield. In every respect, Certain Shield presented itself as *the* major training challenge to V Corps Engineers and represented the culmination of the 130th Engineer Brigade's training year. From river crossings to terrain reinforcement, engineers learned what it means to be a respected and integral member of the combined arms team.

Major Willer was the Assistant Division Engineer, 8th Infantry Division, during REFORGER 78.

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course for the future

Colonel Thomas M. McClellan

FTX Certain Shield, as with all of its predecessors, provided a vast quantity of lessons learned and relearned. The multitude of activities undertaken by V Corps and CONUS engineers opened new vistas of engineer requirements not previously encountered.

To recapitulate, we experienced the "conventional" engineer tasks of river crossings, obstacle emplacement, mine warfare, anti-tank ditching, obstacle breaching, combat engineer construction, line of communications support, rear-area damage recovery, topographical support, engineer intelligence support, and water purification.

We also found ourselves involved in activities such as construction of truly first-class facilities in support of the Joint Visitors Bureau, establishment of a 2,000-person test city complete with all utilities on an existing installation, support of POMCUS weapons firing, crossing area command, maneuver damage control, utilization of ribbon bridge transporters, and equipment draw, clean-up, and turn-in before and after the exercise.

In each activity, the shortcomings of training, or lack of doctrine, or lack of recognition of potential engineer involvement in such support, was repeatedly highlighted, providing us a "course for the future."

The future of V Corps engineers is reflected in master training calendars, ARTEP scenarios, planner conferences, and individual issue papers being presented to Headquarters, US Army Europe, Ft. Belvoir, and other headquarters. These activities are intended to capitalize upon the lessons learned and to orient our actions to minimize the relearning of these lessons in future exercises. We, therefore, look upon "lessons learned" as a dynamic continuing activity for the preparation of our engineers to best support the combined arms teams during the first battle of the next war.

RIVER CROSSING DOCTRINE

As discussed previously, current engineer doctrine does not adequately address the type of river crossing experienced by V Corps Blue Forces elements during FTX Certain Shield. Some might describe it as an administrative river crossing or even as a deliberate crossing without enemy contact. But it was not an administrative crossing because enemy threat was present. It was also not a deliberate crossing without contact and to have treated it as such would have necessitated far more resources than were actually required.

We should examine the experiences of this kind of exercise in great detail and include it in engineer doctrine on river crossings. We, of V Corps, believe this type crossing is unique and merits doctrinal consideration.

OBSTACLE EMPLACEMENT AND ENGINEER CAPABILITY

The first battle of the next war will instantly involve all combat engineer forces in mobility and counter-mobility operations. The need for the capability of rapid mine field emplacement, rapid road crater emplacement, and rapid tank ditch emplacement can not be overstressed. The equipment currently available simply does not meet speed, mobility, serviceablilty, and flexibility requirements. The M56 mine-laying system represents true advancement in speed of mine laying. However, it is not a reliable system, considering the uncertainty of weather on the European battlefield and its impact on aircraft delivery systems.

If engineers are to provide the combat multiplier imperative to the modern battlefield, and particularly in light of the "come as you are war," we must have modern systems on the ground and in the hands of combat engineers when the first battle begins. The M180 Cratering Kit, GEMMS, UET, SLUFAE, and comparable or more advanced systems must not be delayed in developmental programs.

CONSTRUCTION, LOC, AND REAR AREA SUPPORT

Specialization continues to increase as weapons and support systems become more sophisticated. However, engineers must not be misled along these lines. Combat engineer battalions of the division and Corps must continue to be capable of diverse support. The elimination of carpentry tool kits, haul capability, loading capability, communications capability, and other support required to accomplish missions in association with the subjects indicated above, cannot and must not be further considered.

Combat engineers historically have been able to respond to battlefield needs from forward of the front

REFORGER 78
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maneuver elements to the rear of the communications zone. Particularly in view of the "come as you are war," these capabilities must be retained.

The need to reduce vehicles, to standardize vehicle fleets, etc., is recognized. However, these must be balanced against the continuing demand placed upon the combat engineer system. And, it must be recognized that we ARE a "system," not simply an MOS or career-management field. The 12B and his equipment will continue to be called upon to provide the scope and magnitude of support that our history reveals to us. The modern European battlefield and the experiences of engineers in every REFORGER exercise substantiate this statement. We cannot ignore the moving finger of history.

NON-STANDARD ENGINEER REQUIREMENTS

Engineer trucks and other transport means, going back to the days of horses and wagons and beyond, have been utilized in support of non-engineer missions. Therefore, the utilization of ribbon bridge transporters in Certain Shield is not looked upon as unique. However, the experiences of Certain Shield reveal the need for both doctrinal and equipment review in order to capitalize upon this resource.

It is not envisioned that ribbon bridge transporters would ever be permanently detailed for movement of Class 5 or other supply/transportation functions. However, due to the sheer numerical strength of ribbon bridge companies, and the limited internal support capability, effective utilization of the transporters in such roles necessitates specific address to the matters of command, control, and life support. Though these could be addressed and resolved in an ad hoc, local environment, the best interests of the Army would be better served if doctrinal recognition is made known to the entire combined arms team.

Currently, only ribbon bridge companies stationed in Europe are equipped with pallets for the ribbon bridge transporters. This is an equipment deficiency that must be corrected as it pertains to CONUS-based reinforcing engineer bridge units. All engineer units equipped with the ribbon bridge transporter capability must be knowledgeable in the operations and limitations connected with such equipment.

EXERCISE SUPPORT ACTIVITIES

Maneuver damage control must be construed as an essential exercise function, separate from the wartime mission of rear-area damage control. It is a unique peace-time requirement that will continue as long as peace endures in Europe. It would, therefore, appear prudent that doctrine address the uniqueness of this activity. CONUS-based engineer units participating in exercises such as REFORGER should be as prepared to assume this mission as their European-based counterparts.

The draw, clean-up, and turn-in of equipment to POMCUS stocks is not totally a peace-time activity, since the draw, at least, is directly related to war-time requirements. In every REFORGER, there is a recurring requirement to orient units on the peculiarities of POMCUS equipment and its related activities. Therefore, it again appears prudent to address these matters as a part of peace-time doctrine for CONUS-based engineer units.

SPECIFIC ACTIONS FOR THE FUTURE

V Corps engineer units have utilized the lessons and the mistakes of FTX Certain Shield to establish future training activities. As an example, all engineer units of V Corps participated in a six-week BRIDGEX (bridge training exercise) during February-March 1979. It was designed to not only better train all units in bridging activities, but to provide dedicated, identified, skill qualification training for soldiers in career management field 12B and 12C.

For the first time in history, the 130th Engineer Brigade has been authorized major training time during calendar year 1979. Previously, Brigade units were only involved in construction support at major training areas and were relegated to local training areas for all other engineer training; or, were restricted to maneuver areas in which actual operations were not permitted.

The major taining area time will be utilized to conduct the annual Army Training and Evaluation Program (ARTEP) for the Brigade's combat battalions. These ARTEPS will emphasize and focus upon the actual use of explosives, tank ditching, mine laying, obstacle breaching, and the myriad of other combat engineer tasks, rather than the extensive use of simulation as experienced in previous ARTEPS.

The Brigade and Corps Engineer staff section are currently involved with planning of map exercises and communications exercises which will involve not only engineer units of the Corps, but also the tactical headquarters that engineers support. These exercises are designed to test the viability of the engineer support system and its capabilities to provide required engineer support on a sustained basis.

In conjunction with these exercises, the style, format, and content of engineer reports will be thoroughly examined in order that only essential information is requested in what is expected to be a most complex electronic counter measure (ECM) battlefield.

In recognition of the ECM battlefield, communications training is being focused on survivability and mission accomplishment. Similarly, NBC training and survivability in an NBC environment is being emphasized. During the course of the previously mentioned ARTEPS, these two areas will be specifically tested.

In short, the training program for all V Corps units for calendar year 1979 centers around the lessons learned during FTX Certain Shield. Numerous other programs and actions stemming from Certain Shield are also being

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initiated. Certain Shield was not only a "graduation exercise" for the calendar year 1978 training program, but also provided the "curriculum study" for the establishment of the 1979 program.

CONCLUSIONS

In summary, and in retrospect, FTX Certain Shield provided the participating combined engineer team of V Corps its most unique, challenging, and rewarding professional experience of recent years. The achievements of individual engineer soldiers can only be expressed as magnificent! For planners and commanders at all levels it was a highlight of professional development. To other members of the combined arms team, the combined engineer team again proved it is outstandingly capable of providing required engineer support on the battlefield. Restating the motto of the 130th Engineer Brigade, V Corps engineers are, indeed, "COMBAT READY."

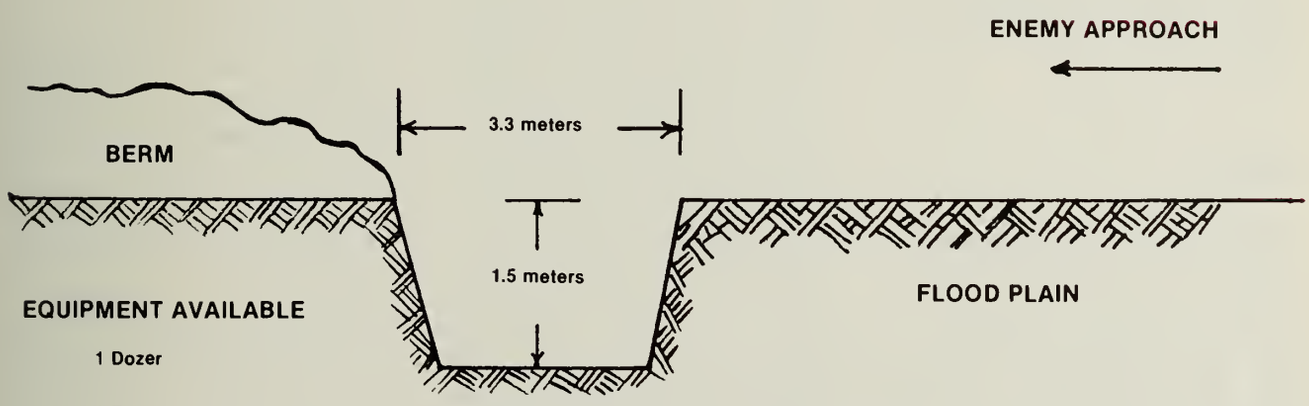
Engineer Problem

SITUATION

You are the company commander of B Company, 24th Engineer Battalion, in direct support of the 2nd Brigade, 4th Armored Division. You are working with the brigade staff in preparing a barrier plan along the Tauber River. The Tauber flows north in the brigade sector and is located in a deep trench-like valley which can only be crossed by armored vehicles in a few critical defiles. The brigade commander has decided to place an anti-tank ditch across one of these defiles to impede an enemy avenue of approach.

During the planning session, the brigade S-3 asks you to provide him with an estimate of how soon this obstacle can be completed. From the situation map, you see that the anti-tank ditch will be 200 meters in length. You know that to be effective against tanks, the ditch must be a minimum of 1.5 meters deep and 3.3 meters wide. You also note from the situation map that your company CP is located 18 kilometers by road from the obstacle site.

MISSION REQUIREMENT: Construct anti-tank ditch 200 meters long, 3.3 meters wide, and 1.5 meters deep



EQUIPMENT AVAILABLE

- 1 Dozer
- 1 Front Loader
- 1 JD 410 Tractor
- 2 Dump Trucks

PROBLEM

How would you accomplish this mission? The company presently has one 2-1/2 cubic yard front loader and two 5-ton dump trucks deadlined. What is your estimate of the mission completion time?

See THE SCHOOL SOLUTION, page 44.

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Officer Career Info

COLONELS

Photographs, physical exams and Officer Record Briefs (ORB) should be kept up to date. If your photo is more than three years old, it needs to be replaced by a more recent photo. Older photos may tend to represent you as an "out-of-date" officer. Photos provide a first impression to board members examining your performance file.

Physical exams are due for all officers in the birthday month at ages 19, 23, 27, 31, 35, 39, 41, 43, 45, 47, 49, and annually thereafter. Medical activities forward copies of 0-6 physical exams for filing in the official MILPERCEN file. Officer in grades below Colonel have the new physical exam data posted by the servicing MILPO onto the ORB.

Key items in the ORB which must be current are duty title, DMOS, mailing address, date of last physical exam, DEROS, correct specialties, and military education.

MAJORS

For planning purposes, all majors with a date of rank between March 1 1971 and September 1974 should insure that their Official Military Personnel File is correct and current. Also, they should also carefully review their ORB, with particular attention on the date of their last physical exam and height/weight data. A current photo should also be on file.

Assignment priorities for the Army remain the same with ROTC, ARR, USAREC and USMA occupying the top positions. CONUS assignments remain 36-month tours unless higher priority requirements dictate curtailment.

COMPANY GRADE OFFICERS

An Army officer's alternate specialty may be designated in a number of ways, including the following:

(1) *Event* oriented designation: keyed to those officers who complete a curriculum under a full-time Army graduate school program which clearly aligns with an alternate specialty (e.g., ADP or ORSA) or who complete flight training. Event oriented designation may occur at any time.

(2) *Permissive* specialty designation: may occur prior to the eighth year of Active Federal Commissioned Service (AFCS) for those officers clearly qualified by virtue of graduate study or experience that closely aligns to another specialty.

(3) By year group: the normal alternate specialty designation procedure. All officers are designated an alternate specialty by the completion of their eighth year of AFCS. The process involves submission of mark sense preference forms by all officers. The forms are distributed to local MILPOs during the Fall of each year. Submission of preferences is solicited for all officers in their seventh year of AFCS. Along with education, experience, and Army needs, preferences are considered in the designation process. All officers are notified of their alternate specialty designations through their local MILPOs in late Spring.

Engineer officers frequently ask what second specialty would be best for them. The answer depends on factors such as experience, background, and talents that could be appropriately aligned with another specialty. What are your long range professional development goals? Can they reasonably be met with the proposed specialty combination? See DA Pamphlet 600-3 for help in answering the latter question.

Finally, the Army's needs will have a great influence on your final specialty designation. "Needs" are specified in terms of participation objectives, or quotas, that must be filled in order to preclude underalignment or overalignment of particular specialties.

In short, not everyone can be designated specialty 49 (ORSA) or specialty 51 (Research and Development), the two most popular alternate specialties for engineer officers, based on preference history. Engineers have a choice over the full range of specialties (except SC 11, 12, 13, and 14) and participation objectives insure that most of these specialties are designated.

WARRANT OFFICERS

Regular Army warrant officers may now apply for direct appointments as USAR commissioned officers without concurrent active duty and without having to resign their RA warrants. This recent policy change will be implemented by change 9 to AR 135-100, which should have already reached the field. Instructions for the preparation and processing of applications are contained in the regulation.

If your unit has not yet received the change, you may still process your application through the chain of command to the Reserve Components Personnel and Administration Center (RCPAC).

PAPER OMPF PURCHASES

Paper copies of Official Military Personnel Files for general officers,

colonels and warrant officers have already been destroyed by MILPERCEN in the process of converting to microfiche, but paper copies of the files of all other officers may still be available for purchase.

Paper copies of captains' OMPFs were scheduled to be destroyed in May, while OMPFs of lieutenant Colonels are scheduled for destruction in July and the OMPFs of majors and lieutenants are scheduled for destruction in September.

Records still available may be purchased for $2 at the MILPERCEN Records Review Unit, Room 5S33, Hoffman II or through the mail. If you intend to visit MILPERCEN, an appointment is necessary (call Autovon 221-9618/9 or commercial 202-325-9618/9). The address for mail purchases is Commander; MILPERCEN: ATTN: DAPC-PSR-SR; 200 Stovall Street; Alexandria, VA 22332. Letters should contain a statement indicating that the paper record will not be used or sold as the OMPF. Fees to cover the cost of mailing are listed below. Checks should be made payable to the Treasurer of the United States.

Lieutenant Colonels	$4.75
Majors	4.50
Captains	4.25
First Lieutenants	4.00
Second Lieutenants	3.00

NEW OER

The Army's new Officer Evaluation Report (OER), set for implementation 1 November 1979, should have more credibility among officers than the curent OER.

In developing the new report, the Army's Military Personnel Center (MILPERCEN) gathered information from more than 100 Active Army, Army National Guard and Army Reserve organizations, a large cross section of the Active Army officer corps, more than 50 selection boards and a large number of DA managers. A great deal of assistance, support and enthusiasm came from field participants.

The effort also included a worldwide survey of the officer corps and a review of information from past Army systems, other services, selected foreign services, civilian industry, government and academia.

The new system uses three forms:

DA Form 67-8 replaces DA Form 67-7, the current OER. The new form differs in several ways. It does not use a numerical score. It emphasizes the duty description. It includes a more structured performance narrative. It increases the role of the more senior officer in the rating chain.

DA Form 67-8-1, the Support Form, accompanies the OER through the rating chain but does not go to DA. It allows the rater and the rated officer to discuss the duty description and specific objectives at the beginning of the rating period and encourages counseling then and throughout the period. It also allows the rated officer, at the end of the rating period, to describe his accomplishments in light of the duties and objectives.

DA Form 67-8-2, the Tracking Form, is the DA's use in maintaining a record of the evaluation history of each senior rater. It indicates whether the rater is ordinarily an "easy" or a "hard" rater.

The new OER system incorporates several features not included in previous officer evaluation reporting systems:

Rated officer participation. The rated officer's participation throughout the rating period should improve the professional development of officers and the effectiveness of organizations.

Senior rater concept. The names of rating officials have been changed from rater, indorser and reviewer to rater, intermediate rater and senior rater. Most rating situations will involve only two rating officials, the rater and the senior rater (usually the same person as the current system's indorser). The senior rater's role has been increased from a purely administrative one to a more active one that includes a critical evaluation of the rated officer's potential.

Senior rater profile. The profile provides a comparison of a specific rating with a senior rater's normal rating tendency.

Professional development. The emphasis on better communication, objective-setting and development of subordinates helps daily performance and expands the traditional functions of the officer evaluation system.

Personnel management. Explicit techniques and procedures support the specialty concept, focus attention on the human side of the organization, emphasize the functions of programs, and encourage communication.

Administrative accuracy. The new system simplifies certain administrative items such as the accountability of rating periods, and it allows the rated officer to review and authenticate administrative data.

In the transition to the new system, each officer will get a final report under the old system. This will ensure "a degree of fairness that was lacking when we changed systems in the past," said General Bernard W. Rogers, Army Chief of Staff, in announcing the target date for implementation.

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Enlisted Career Info

RETURN OF MOS 12F

In 1976, the 12F Combat Engineer Vehicle/Armored Vehicle Launched Bridge (CEV/AVLB) Crewman was converted to MOS 11E because the former MOS did not provide a viable career structure. This redesignation degraded the capability of the Engineer System to reinforce combat operations on the modern battlefield.

Effective 1 September, MOS 12F is being ressurrected and will include Engineer Armored Personnel Carrier (APC) Operators as well as CEV/AVLB Crewmen. The inclusion of the APC Operators will broaden the base of the MOS and, in conjunction with the 55 additional E7 slots, the new MOS will provide a viable career structure.

Reclassification will be mandatory for all 12B1U personnel. Reclassification will also be mandatory for all current Skill Level 1 incumbents (19E10 and 19F10) now serving in CEV/AVLB positions. Reclassification will be voluntary for Skill Level 2 and above personnel currently or formerly associated with CEV or AVLB.

Preparation of Soldier's Manuals and Commander's Manuals for MOS 12F is being accomplished at the U.S. Army Engineer Center, Fort Belvoir. Coordinating drafts of the manuals are tentatively scheduled for completion in July.

The initial SQT testing period will be January-June 1981, the earliest possible date since an MOS must exist for a minimum of 12 months prior to testing.

APPRENTICESHIP PROGRAM

If you hold a primary or secondary MOS of 62B Engineer Equipment Repairman and are working in that MOS, you may document your work experience and related instruction toward a U.S. Department of Labor Certificate of Completion. The certificate certifies that journeyman status has been attained and provides appropriate documentation, in civilian terms, of apprenticeable skills acquired while in the Army. For more information and enrollment, contact your education officer.

OCS APPLICATIONS

Personnel interested in attending Officer Candidate School should submit a completed DA Form 61, Application for Appointment, to MILPERCEN no later than 22 June. That is the deadline for receipt of applications for OCS Class 5-79 beginning 23 September. The deadline for receipt of applications for Class 4-79 beginning 3 June was 2 March.

SENIOR ENLISTED SOLDIERS TO INCREASE

The Army plans to increase the number of senior enlisted soldiers on active duty between 1979 and 1984. The latest revision of the Enlisted Force Management Plan (EFMP) calls for 15,000 more Soldiers in grades E4 and above (8,000 of whom are E5s or above). This is the third revision of the EFMP. (The last revision of the plan was in June 1975.) The grade structure and career content goals were changed because there are more soldiers qualified for reenlistment than anticipated. Also, the results of the Enlisted Personnel Management System review determined a requirement for more soldiers in grades E4 and above.

The EFMP's objectives are designed to meet the Army's experience and skill level requirements better and at a more reasonable cost. While the plan increases the number of senior soldiers, it does not increase the Army's total size. The increased stability and lower turnover rate, however, will result in more soldiers being available for assignment to units.

SCUBA DIVERS WANTED

The Engineer Branch, EPMD, MILPERCEN, is seeking a limited number of volunteers to attend Scuba Diver training. Volunteers must hold a primary MOS of 12B or 12C and be qualified IAW Paragraph 2-2, AR 611-75. Waiver of grade requirements will be considered on a case-by-case basis for personnel in grades E6 and E7. Approved volunteers will attend a four-week Scuba school TDY enroute to an assignment in Germany or Korea. Soldiers desiring to volunteer for Scuba training should contact their PSNCO or local Military Personnel Officer for details.

WOULD YOU RATHER SWITCH

Some soldiers in engineer specialties can now be reassigned to related MOSs, according to MILPERCEN. Based on unit needs, soldiers in Career Management Field (CMF) 51, General Engineering, can be assigned as follows:

(a) Soldiers holding MOS 62E, Crawler Tractor Operator, can be assigned to 62F, Crane Operator, and vice versa.

(b) Soldiers holding MOS 51N (Water Supply Specialist), 51R (Electrician), 51P (Utilities Foreman), 51T (Technical Engineering Supervisor), and 62N (Construction Machine Supervisor) can be assigned to MOS 51H (Construction Foreman).

An upcoming change to AR 611-20 will provide details.

EDUCATION OPPORTUNITIES EXPANDED

Educational opportunities for military personnel have taken a giant step forward with the alliance of military services and the Servicemen's Opportunity Colleges (SOC) organization.

The SOC program is a network formed by over 300 cooperating colleges and universities who have agreed to get rid of barriers to degree completion faced by military students. SOC currently standardizes procedures for academic evaluation of military schooling, experience, and training for over 300 participating educational institutions. The program provides flexible credit transfer options leading to an associate or baccalaureate degree.

SOC replaces Project AHEAD (Army Help for Education and Development), which was established in 1974 to help attract quality volunteers and improve the overall educational level of the Army. Project AHEAD was strictly an Army program. SOC provides its services to all military departments. The change-over will not affect soldiers currently enrolled in Project AHEAD.

The advantages to military personnel include special arrangements to enroll qualified servicemembers, a more liberal policy for transferring academic credits from other institutions, and adjustable residence requirements. SOC schools offer a degree plan, counseling services, and degrees to eligible students who have completed the appropriate number of semester hours, depending on the program. Participating schools have agreed to accept the recommendations of the American Council on Education for granting credit for non-traditional learning, such as military training and credit-by-examination, if appropriate for the education discipline.

The associate degree program sponsored by SOC—SOCAD—expanded to soldiers overseas last December, with six participating colleges and universities. Over 70 of the 300 SOC schools are participating in SOCAD.

The SOCAD program was originally designed for Combat Arms personnel, but is being expanded to meet the needs of other service personnel. In the past, the infantry, armor or artillery soldier was restricted in furthering his education because of the nature of his duties. SOC and ACE did in-depth studies with the Army to evaluate the duties and experience learned by soldiers in the Combat Arms and to apply education credits for knowledge.

SOC has since developed associate degree programs for soldiers in Air Defense Missile Maintenance, Field and Area Communications Maintenance, Fixed Plant Communication Maintenance, Food Service, and Mechanical Maintenance. SOC plans to add 15 more associate degree programs during 1979 in other career fields, including Civil Engineering, Data Processing Technology, and Construction and Mechanical Engineering.

CHANGE TO CSM APPOINTMENTS

Since the creation of the Command Sergeant Major Program, acceptance/declination has been an individual prerogative that could be exercised either before or after selection by the board. The majority of declinations have been submitted after selection, resulting in wasted effort by selection boards and an increased workload for the CSM/SGM Office at MILPERCEN.

In an effort to put more discipline in the selection procedures, changes have been made to Chapter 14, AR 614-200. Significant departure from the current policy is summarized below:

* The deletion of the declination after selection option.

* The requirement that individuals who do not decline consideration prior to convening of the selection board, and are selected for appointment to CSM, either accept entry into the CSM program, or apply for non-disability retirement (if otherwise eligible) within 30 days after the selection list is announced.

These changes are included in Change 40 to AR 614-200.

ANCOES

The board to select soldiers in grade E-6 for attendance at Advance Noncommissioned Officer Education System (ANCOES) courses during Fiscal Year 1980 was scheduled to convene in April.

Soldiers considered for FY 80 courses included those in grade E-6, with a date of rank after March 1974 or before April 1977, who had a BASD after October 1962 and who had not been previously selected for ANCOES.

CSM BOARDS

A Command Sergeant Major selection board will convene 5 June at Fort Benjamin Harrison. A separate CSM retention board (for service up to 35 years) will convene 15 June at Fort Harrison.

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NCO Channels

"The leadership of the noncommissioned officer is usually the minute-by-minute interface with the soldiers, the E-1s, 2s, 3s, and 4s. It is important, therefore, that we continue to give the kind of authority that we've been giving to noncommissioned officers. That trend is continuing; its results are very successful and we hope it will continue in the foreseeable future."—Secretary of the Army Clifford Alexander.

PRIMARY TECHNICAL COURSE 52D20

Primary Technical Course 52D20 at The Engineer School is oriented to students who have *not* completed the 20 level course of instruction. However, soldiers already qualified at the 20 level as a result of completing the course of instruction after Advanced Individual Training continue to enroll in PTC 52D20. Units are encouraged to screen course applicants to determine if they are already qualified at the 20 level.

52D10 TRAINING

The 52D10 Generator Repairman course has been a self-paced course of instruction since October 1978. The course is designed to train soldiers as apprentices at skill level 10. It is important that Generator Repairmen at the 20 and 30 levels recognize that soldiers at the 10 level need further training to become fully qualified repairmen, and to pass their skill qualification tests.

Many soldiers in the field apparently believe that generator repairmen trained only at the 10 level are fully qualified and need no further training. Such beliefs are totally unfounded. Supervisors must realize that Army policy dictates that a soldier's unit is responsible for providing additional training for the apprentice Generator Repairman.

EXCHANGE INSTRUCTOR

The Australian School of Military Engineering in Liverpool, New South Wales, Australia, has a new exchange instructor at the U.S. Army Engineer School. He is Master Sergeant Anthony Polelli, a recent graduate of the U.S. Army's Sergeants Major Academy at Fort Bliss, TX. MSG Polelli is the third exchange instructor assigned to his position since it was first authorized in 1975. He has an extensive background in combat and general engineering and has served most of his career in the Corps of Engineers.

ADVANCED NCO COURSE REQUIREMENTS

Noncommissioned officers who have attended the Advanced NCO Course at The Engineer School are reminded that if they have a requirement to complete a specific correspondence course for graduate status, they must complete it within one year from the date of their class graduation. To date, several NCOs have not met this requirement and time is running out.

NCOs who fail to meet the one-year requirement are placed in a non-graduate status. Such action has a serious adverse impact upon career advancement. Former students who are in jeopardy of failing to meet the correspondence course requirement may contact The Engineer School for more specific details.

TERRAIN ANALYSIS TRAINING

As mentioned here before, the Defense Mapping School (DMS) conducts resident instruction in surveying, cartography, graphic arts, topographic sciences and related subjects. Whether Terrain Analysis is a "topographic science" or a "related subject" is of little consequence. The important point is that DMS offers instruction in Terrain Analysis.

If you're up-to-date on the soon-to-be-implemented Topo "H" Series TOE, you know that a lot of analysts are going to be needed. Perhaps you have a need now. There are quotas at the School "going begging."

Coordination on class starts and exact class vacancies can be accomplished by corresponding with the Director, Defense Mapping School, ATTN: PRT (Student Requirements/Allocations Coordinator), Fort Belvoir, VA 22060. Autovon 354-3673.

TOPOGRAPHIC SUPPORT SYSTEM

The Topographic Support System (TSS) nears completion with fewer tests and modifications being made every month. Things are looking good enough for USAES, Engineer Topographic Labs, MERADCOM, and the Defense Mapping School to begin to examine training requirements, particularly in the maintenance area.

Although plans are not complete, it appears that most of the operator and operator maintenance courses (and some organizational maintenance) will be taught by the Defense Mapping School. While that takes care of the AIT student, it leaves somewhat of a gap in the field which could be filled by Mobile Training Teams (MTTs) from the School or through contract with equipment manufacturers. These are details yet to be worked out, but rest assured, you'll get what you need.

Reserve Components

THE YEAR OF THE TOTAL ARMY

"I will personally direct a campaign to insure that the Army leadership addresses Guard and Reserve issues in a forthright and high priority fashion . . . . . Every decision made within the Secretariat and Staff, as well as at our major command headquarters, will be made with Total Army requirements in mind."—Secretary of the Army Clifford L. Alexander in his speech to the National Guard Association convention late last year.

MOBILIZATION DESIGNEES WANTED

The United States Army Engineer School needs qualified Individual Ready Reservists (IRR) for assignment to the school's mobilization designee program. During mobilization, training will be expanded for EOBC, AIT, and reactivation of the Engineer Officer Candidate School (OCS). Qualified instructors and cadre will receive 12 days of Annual Training per year at Fort Belvoir, VA.

In addition, instructors and trainers, at their option, may perform work on special projects at home for one retirement point per two hours expended, not to exceed one point per day. Twelve-day tours can be scheduled year round as mutually agreed upon by reservist and sponsor.

All active reservists are eligible, as well as RA personnel applying for the USAR IAW AR 135-100, ARNG personnel who request transfer to the USAR, and recent retirees. The latter may earn additional retirement credits and qualify for further USAR promotion, while only forfeiting retired pay during their 12-day AT period.

Immediate openings exist for engineer Captains and Majors, engineer mechanics (E5s thru E7s in MOS 62B), and generator repairmen (E5s and E6s in MOS 52D).

Openings will soon be available for engineer lieutenants, 621A Warrant Officers, Combat engineers (MOS 12B/Z) in grades E5 thru E8, Atomic Demolition Munitions Specialists (MOS 12E) in grades E5 thru E7, and Special Electrical Devices Repairmen (MOS 35E) in grades E5 and E6.

To apply, submit DA Form 2976 direct to RCPAC. For additional information, send a copy of your application to the Reserve Affairs Advisor, Directorate of Training, USAES, Fort Belvoir, VA 22060. You will be contacted by telephone.

TECHNICIAN CONVERSION PROGRAM

Headquarters, DA, has been directed to initiate a test program to convert a limited number of USAR technician vacancies to military positions to be occupied by Reservists on Active Duty. Recruitment is underway. Although the technician conversion program will be operated essentially the same as the Full Time Manning Program, it will be treated as a separate entity. Interested Reservists should contact their unit commanders or write to: Commander, RCPAC, 9700 Page Boulevard, St. Louis, MO 63132. Note that only *vacant* technician spaces are involved in the test.

SENIOR SERVICE COLLEGES

Solicitation for prospective students at the U.S. Army War College, the National War College, the Industrial College of the Armed Forces, the U.S. Army Command and General Staff College, and the Logistics Executive Development Course will begin in May. The suspense date for applications, through channels, has been tentatively set for 1 November, with the selection board slated to convene in December. Applications for both resident and correspondence programs, where applicable, will be considered.

SENIOR NCO SELECTION BOARD

The Senior Noncommissioned Officer Selection Board will convene at RCPAC on 3 September. The board will consider eligible senior NCOs for lateral appointment as Command Sergeants Major and for attendance at the U.S. Army Sergeants Major Academy (Resident and Nonresident). All eligible NCOs should prepare now for submission of applications. RCPAC will be forthcoming.

STAT TOUR OPENING

Beginning 1 June, the position of Construction Officer (a four-year Statutory Tour position in OCAR) in the Construction Management Office will be open. Special qualifications for the position include the rank of Major or Lieutenant Colonel, a BS in Engineering, completion of the C&GSC, a "Secret" clearance, and at least five years experience as an engineer design or construction project manager. Interested officers should send applications to the Reserve Components Personnel and Administration Center, ATTN: AGUZ-PMM-T, 9700 Page Blvd, St. Louis, MO 63132.

EMPLOYER SUPPORT

The National Committee for Employer Support of the Guard and Reserve is planning an employer appreciation month during September. The purpose will be to recognize the supportive efforts of the employers of Reservists and Guardsmen and to solicit increased public awareness and employer support. Questions may be directed to the National Committee at commercial 202-697-6902 or Autovon 227-6902.

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The School Solution

MISSION CONSIDERATIONS

1. *Method to Accomplish the Mission:* The creation of an anti-tank ditch is essentially a task to be accomplished with construction equipment. Available are one dozer, one front loader, the JD 410 utility tractor and two dump trucks. Since the obstacle is located on the flood plain of the stream, soil conditions consist of alternating layers of silt, clay, and thinly bedded sands and gravels. Obviously, the dozer is the most productive item for creating a trench. By pairing the available front loader with the dozer, we can maximize the dozer production. The front loader will push the spoil created by the dozer at right angles to the anti-tank ditch, creating a berm on the friendly side of the obstacle.
2. *Travel Time:* The equipment to accomplish the task is located at the company CP. The dozer is loaded on the tractor trailer. You estimate that the front loader will govern the convoy speed at 15 MPH (24 KPH). Accordingly, after notifying the XO by radio to proceed to the obstacle site, you estimate it will require 18K/24KPH = .75 hrs (45 minutes) to arrive at the work site. An additional 15 minutes will be required to unload the dozer and brief personnel on the work requirement. Work could commence one hour after notifying the XO.
3. *Task Analysis:* The volume of material to be excavated is determined as follows:

   200m x 1.5m x 3.3m = 990 Bank Cubic Meters
   990 BCM x 1.308 BCY/BCM = 1295 Bank Cubic Yards

   However, the excavated material must be converted from bank cubic yards (BCY) to loose cubic yards (LCY) to analyze the front loader production. The conversion factor from Table 12-5 (not shown) ranges from 1.11 for sand to 1.43 for clay. Since alluvial (river deposits) material is a mixture, use 1.25 as an average conversion factor. Therefore, the 1295 BCY excavated by the dozer produces 1619 LCU (1295 x 1.25) of material to be handled by the front loader.

TABLE 12.2. STRIPPING, EXCAVATING, AND HAULING

Production Estimates in Bank Cubic Yards per Hour

DISTANCE	EQUIPMENT: DOZER MED, FT	R/T TRACTOR SCRAPER - 18 CU YD	SCRAPER 24 CU YD
15 ft	1600		
30 ft	870		
50 ft	512	259	345
75 ft	350	288	374
100 ft	263	288	374
150 ft	175	240	354
300 ft	87	183	336
500 ft		226	285

4. *Production Rates:* Using FM 5-34 you must estimate production rates for both the dozer and the front loader. Table 12-2 provides production estimates for the dozer ranging from 1600 BCY/hr to 87 BCY/hr, depending on the haul distance. Scoop loader production is provided in Table 12-4, and for the 2-1/3 cy loader, ranges from 450 LCY/hr to 45 LCY/hr, depending on cycle time. Obviously, you want to balance the production rates of both items of equipment. The maximum capability of the front loader is 450 LCY/hr on a 20 second cycle. Converting 450 LCY to BCY results in 450/1.25 = 360 BCY.

   Accordingly, you want to set the dozer production at 360 BCY to balance the production rates of both items of equipment. From Table 12-2 you see that a dozer will excavate 350 BCY/hr over a haul distance of 75 feet.

   Thus, 350 BCY/hr optimizes the production rates of both items of equipment. One other correction is required to obtained a final production rate. You must apply an efficiency factor of 0.83 for day operations or 0.75 for night operations.

   Production rate (day) = 350 x 0.83 = 29 BCY/hour.
   Production rate (night) = 350 x 0.75 = 263 BCY/hour.
5. *Task Completion Time (TCT):* Determined by dividing the volume of material to be excavated by the production rate.

   TCT = 1295/291 = 4.5 hours (day)
   or 1295/263 = 4.9 hours (night)
6. *Mission Completion Time* (MCT): To accomplish the mission, add the time to excavate the anti-tank ditch to the travel time.

   MCT (day) = 4.5 hrs + 1 hr = 5.5 hrs.
   MCT (night) = 4.9 hrs + 1 hr = 5.9 hrs.

   After completing your analysis, advise the Brigade S-3 that you can complete the anti-tank ditch within six hours after being ordered to execute the obstacle.

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A soldier in the 82nd Engineer Battalion, USAREUR, wrote the letter below and gave it to his commanding officer. He prefers to remain anonymous, but I would like to share it with all members of the Army engineer family.—JJH

I am a soldier in the United States Army. My MOS is 12B, Combat Engineer. From the time of my enlistment to the present is not important; however, what I have learned during this time period is more valuable than diamonds, more precious than gold, and more satisfying than a beautiful woman.

What is it, you ask? I answer: knowledge, pride, achievement, and a sense of belonging never before felt in my life. Knowledge, in knowing that the job I do and how I perform that job is vital and necessary to the safety of the only country that I love, with my entire being.

Pride, in belonging to the only element of the American defense system that time and time again has proven that no matter what type of situation they find themselves in, there is always a way out and they will find it.

Achievement, starting a job, completing that job, and knowing that the job, when it is finished, is the best job that has ever been done.

Belonging, to a system that is both fair and just in its appointed duties and never stops trying to improve on the quality of its personnel and equipment. Using the most advanced and up-to-date training methods devised by man or machine.

During my short, but so far satisfying career, I have attained a fairly unbiased opinion about the happenings in this battalion, and I see no reason why anyone in their right mind could not expect us to do the job that has been handed down to us, and to do the job well above all expectations.

Assurance of a job well done is accomplished by the everyday job we do, the training in garrison and in the field, and most important of all, the leader. His job is the successful completion of the mission, using the only means available to him, his men. The individual soldier in a squad, platoon, company, or battalion is the means of getting the job done and doing it the best way possible. And having well trained personnel is accomplished through supervision and training provided by NCOs and officers above them.

The biggest thing to remember as you progress through your military career is that no matter how tough a job might be, or how bad a situation might look, everyone around you is trying to do the job expected of them. And in no way should you, as an individual soldier, degrade yourself or your men in a way as to affect yours or their pride in belonging to the first and best line of defense that the United States has to offer an American citizen or allied country.

I have written this short letter in the hopes that after you have read it, you will think about what has been said, and start to care what happens around you, and force yourself to do something about it. This is your obligation as an American fighting man and its about time you started to care. Because I do. I CARE A HELL OF A LOT!

Signed: AN AMERICAN FIGHTING MAN WHO GIVES A DAMN ABOUT HIS JOB AND HIS COUNTRY

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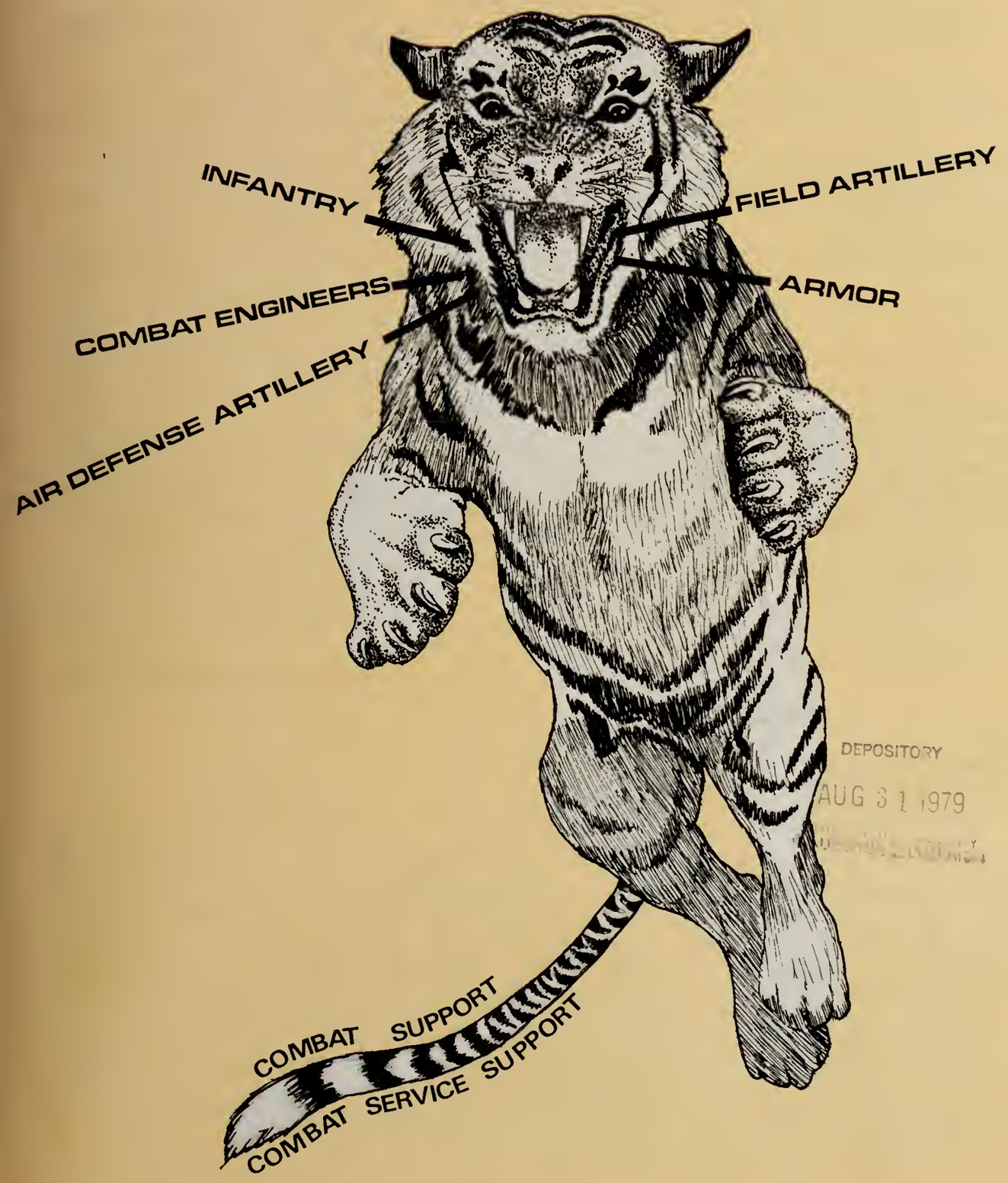

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THE COVER

The concept of the "tooth-to-tail ratio" among our military ground forces is illustrated by PFC Barbara Stultz. Engineers, Infantry, Armor, Field Artillery, and Air Defense Artillery represent the teeth of the tiger, while all other forces have either a combat support or combat service support role, represented by the tail of the tiger.

engineer

VOLUME 9 FALL 1979 NUMBER 2

FEATURES

6 **1979 READERSHIP SURVEY RESULTS**

9 **CHALLENGES TO ENGINEER DOCTRINE**
by Major Stephen E. Draper

15 **MGB: MYTHS AND MISUNDERSTANDINGS**
by Captain Harry N. Hambric

18 **CONTINGENCY MISSIONS—A PREREQUISITE FOR EFFECTIVE RESERVE COMPONENTS TRAINING**
by Lt. Col. Everett R. Thomas

20 **THE "FIGHTIN FIFTH" IN REFORGER 79**
by Major Ronald D. Laux

27 **HOW TO BETTER SELL ENGINEER CAPABILITY TO THE MANEUVER COMMANDER**
by Major V. Paul Baerman

30 **TANK DITCHING IN THE DEFENSE**
by Lt. Col. Jerry A. Hubbard & Major John R. Mullans

34 **SOVIET ENGINEER EQUIPMENT**
by Major Arthur J. Parr, Jr.

page 15

page 25

page 30

DEPARTMENTS

2 NEWS & NOTES
4 LETTERS
5 ENGINEER PROBLEM
39 OFFICER CAREER INFO
40 ENLISTED CAREER INFO
42 NCO CHANNELS
43 RESERVE COMPONENTS
44 THE SCHOOL SOLUTION

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News & Notes

TOP DRILL SERGEANT

Sergeant First Class Stanley Kolchins demonstrates the proper technique of performing "inspection arms" to a pair of female trainees. From among 500 drill sergeants assigned to Fort Leonard Wood, Kolchins has been selected as that installation's Drill Sergeant of the Year, thus qualifying him for DS of the Army competition. He is the senior drill sergeant of Company D, 5th Battalion, 3rd Basic Training Brigade.

GIVE AND TAKE

An annual exchange program between U.S. and British military forces this year involved the **13th Engineer Battalion**, 7th Infantry Division, and the 11th Field Squadron, 38th Engineer Regiment, Ripon, England. While members of Company B, 13th Engineers trained in Ripon, members of the 11th Field Squadron were training with the 13th Engineers at Fort Ord, Fort Hunter Liggett, and Camp Roberts, CA. Training at the U.S. sites included mine field deployment, obstacle emplacement, M4T6 bridge construction, orienteering and rappelling, advanced demolitions, and weapons qualification.

DMS RELOCATION

The results of a study to determine the feasibility of relocating the Defense Mapping School (DMS) are expected to be released this fall. DMS is a "modified tenant activity" of the U.S. Army Engineer Center and Fort Belvoir.

The study was necessary because Bagley Hall, home of the DMS, has deteriorated to the point that replacement within the next three years is essential. **Colonel John J. Meara** was chairman of the study group.

TANK TRAILS UPGRADED

Soldiers of the **563rd Engineer Battalion** have upgraded 26 miles of tank trails in the Grafenwoehr Training Area. Using more than 100 pieces of heavy equipment, including dozers, scrapers, graders, dump trucks, and bucket loaders, the 563rd engineers performed the work during a Combat Engineer Major Training Area Program 22 April - 22 June.

MG James A. Johnson

KEY REASSIGNMENTS

Major General James A. Johnson assumed the duties of Deputy Chief of Engineers on June 1. He is a former commandant of The Engineer School and served as the Corps' North Atlantic Division Engineer for two years prior to his recent reassignment . . . New division engineers include **Brigadier General Henry J. Hatch,** Pacific Ocean Division, and **Colonel Max B. Scheider,** New England Division . . . **Colonel Ted E. Bishop** took over as Director of the Army's Coastal Engineering Research Center in late April . . . **Major General Elvin R. "Vald" Heiberg III** is the new Director of Civil Works, U.S. Army Corps of Engineers.

ARNG UNIT HONORED

For its role in the cleanup operations following the disastrous Johnstown Flood of 1977, the Johnstown based **876th Engineer Battalion** has become the first Pennsylvania Army National Guard unit to receive the prestigious Governor's Unit Citation. Companies A (from Johnstown), B (Punxautawney), C (Hazleton), and D (Finleyville), plus battalion headquarters, assisted Johnstown residents in the aftermath of the flood which swept through a nine-county area on July 20, 1977, after thunderstorms dumped more than 10 inches of rain within a few hours. Personnel of the 876th rescued stranded victims, housed the homeless, and protected personal property from looters. With heavy equipment, they helped clear streams, remove debris, move earth, locate casualties, and construct temporary roads and bridges. The Governor's Unit Citation was created in 1974 to honor outstanding Pennsylvania Army Guard units, but the 876th was the first unit to receive the award.

FORMER CHIEF DIES

Lieutenant General (Ret) William C. Gribble, Jr., 62, a former Army Chief of Engineers, died of cancer June 2 at DeWitt Army Hospital, Fort Belvoir, VA. While serving as director of reactor development with the old Atomic Energy Commission in the mid 1950s, he developed the technical specifications for the Army's first nuclear power plant, which is located at Fort Belvoir. Lt. Gen. Gribble was director of the Army Nuclear Power Program in the early 1960s. He later was the Army's deputy chief of research and development and then deputy chief of staff for force development. He commanded Fort Belvoir and the Army Engineer Center and School for two years before becoming chief of Army research and development in 1971. In 1973, he became Chief of Army Engineers, a post he held until retiring in 1976.

RECRUITERS NEEDED

Qualified and motivated NCOs in grades up to E-7 are needed to fill two-year ADT jobs in the USAR recruiting force. Commanders are urged to encourage their top NCOs to apply for the positions to insure unit support of USAREC's recruiting mission. Readiness and strength maintenance depends on getting more good recruiters on board.

MINE DETECTOR SYSTEM

A $2.3 million contract for engineering development of the Vehicle Mounted Road Mine Detector System (VMRMDS) has been awarded to Cubic Corporation. Eight units will be produced for testing under the initial contract, with the first system set to arrive at the U.S. Army Mobility Equipment Research and Development Command (MERADCOM) in January. VMRMDS represents a major technological breakthrough because it is the only system that can reliably detect both metallic and plastic antitank/antivehicular land mines with a very low false alarm rate. The VMRMDS can clear a path up to 11 feet wide at eight miles an hour over unpaved roads or flat, sparsely vegetated terrain.

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Letters to the Editor

MGB CONTROVERSY

In his article in the Winter 1978-79 edition of THE ENGINEER, Major Harvey G. Ramsey sets out a comparison between Bailey Bridge and Medium Girder Bridge, which leads to a conclusion that inherent limitations of MGB mitigate against its extensive employment on the battlefield. It is felt that this conclusion is reached partly because the full capabilities of MGB are not appreciated and because current procurement plans do not permit the deployment of sufficient bridges or any of the supplementary sets which greatly extend its flexibility.

The full flexibility of MGB is well set out in an article in the March-April 1979 issue of The Military Engineer written by Derek L. Knight, who for several years headed the MGB design team at the Military Vehicles and Engineering Establishment (Christchurch). This article clearly shows that procurement of additional MGB equipment could offer the U.S. Army many advantages and would overcome many of the disadvantages listed by Major Ramsey.

Major Ramsey's article is certainly a most valuable one, which highlights the overall problem of bridging, but it takes a somewhat pessimistic and short term view. Many of the problems can be solved very quickly by the provision of an adequate range of MGB.

LTC (Ret) C. Hartington
Sales Manager
Military Products Division
Fairey Engineering Limited

MAB CAPABILITY

In the article, "The Main River Crossing," Spring 1979 edition, it stated that "Prior to exercise Certain

Shield, the ability of the MAB to handle a high volume of continuous traffic was questionable." This is incorrect. During V Corps exercise Laramie Golden Arrow in June 1973, a MAB bridge was constructed on the Rhine River and was in continuous operation for six hours (0600-1200 hours). Conditions, if not precisely similar, were equally challenging. If my memory does not fail me, the width of the river at the bridge location was 1100 feet and 42 MAB units were needed to construct the bridge. The first MAB hit the water at 0100 hours and the actual bridge construction took one hour and 40 minutes. (Due to the German specified river closure time, the bridge construction had to be halted for three hours and 20 minutes.) This bridge was also constructed under radio silence and blackout conditions. My company—E Company, 23rd Engineer Battalion—and two others—E Companies of the 10th and 12th Engineer Battalions—were needed to construct the bridge. THE ENGINEER Magazine, in late 1973 or early 1974, published an article on this exercise by CPT Bittamore, the commander of E Company, 12th Engineer Battalion at the time of the exercise.

CPT Robert E. Jalette
University of Virginia

ENGINEER INGENUITY

Uniform insignia manufacturers recently began producing Engineer buttons for the mess jackets. This action, in being responsive to this age-old desire of Corps of Engineer officers to outfit their uniforms with the proper buttons, created a new dilemma. The uniform regulation requires all buttons to match. Engineer buttons are not, to my knowledge, available for the shoulder knots. The Engineer cap buttons are the same size but the posts are a different size than those in the shoulder knots. The button screw posts have different diameters, which prevents interchange of the post and button, and the cap button, with post, is too short for the shoulder post. I would like to share my solution to this dilemma with your readers.

I modified my shoulder knots slightly in order to conform to the regulation. I used two cap button devices per shoulder knot in order to comply. I forced a cap button under the knot in between the braid and backing of the knot which will permit screwing the post onto the button. This button is used to affix the shoulder knot to the jacket. I then forced the backing post of the Engineer cap button between the shoulder knot and cap button device previously placed under the knot. This permits screwing the Engineer button on the shoulder knot where it will be visible. The exposed Engineer button is then more or less permanently affixed to the shoulder knot. This solution should help other Engineer officers end years of frustration until Engineer shoulder knot buttons are made available.

LTC Leonard Hasse, Jr.
Fort Belvoir, VA

Engineer Problem

You are the battalion S-3 of the 863rd Engineer Battalion in direct support of the IX Corps. Several motorized rifle divisions have broken through friendly defenses in the Corps' western sector. Friendly forces have conducted a retrograde operation across the Eagle River to the east, while the 20th Armored Cavalry Squadron acted as a covering force on the far bank.

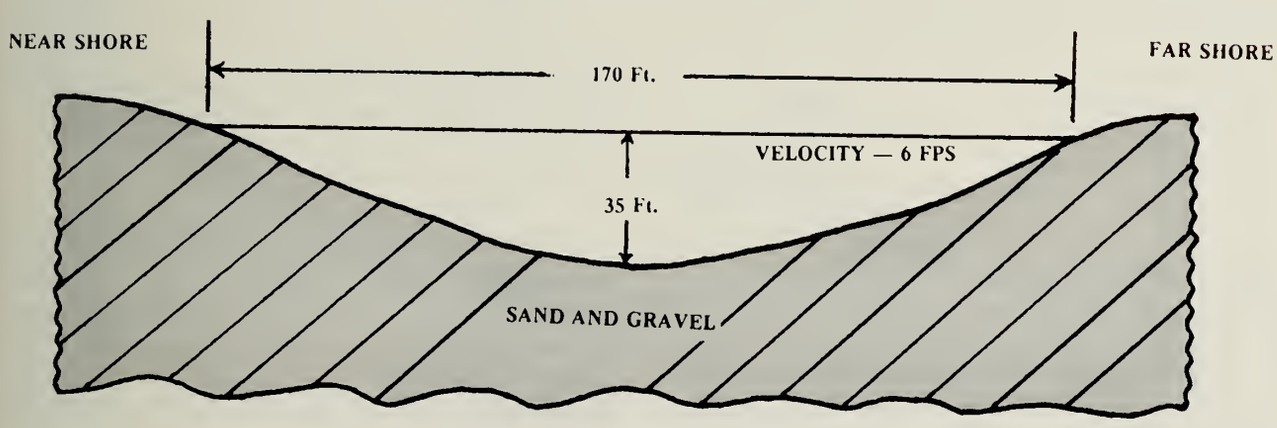
Unfortunately, the Brudenheim Bridge, intended as a withdrawal route for the covering force, has been destroyed by enemy tactical air support. The 20th is stranded on the far bank of the river while in contact with enemy forces. The covering force must be extracted before being decisively engaged by superior enemy forces.

The battalion commander has given you the mission to devise a plan of rescue for the 20th as quickly and effectively as possible. The commander wants your plan within two hours.

From friendly reconnaissance of possible river crossing sites, intelligence reports, and your inspection of available maps, you select a river crossing site with the following pertinent data:

—River width at crossing site is 170 feet
—River depth (maximum) is 35 feet
—Far bank height is approximately 4.5 feet
—Near bank height is approximately 3.5 feet
—Stream velocity is six feet per second
—River bed composition is sand and gravel

Cross Section of Eagle River at Crossing Site



Since a rafting operation would be too time consuming and sufficient Mobile Assault Bridge components are not immediately available, the Ribbon Bridge is the most feasible alternative. Besides, your troops are well-trained in Ribbon Bridging. Bridge construction and crossing will be conducted at night, despite near freezing temperatures (35°F), to maximize security and secrecy. A bridge erection boat (BEB) temporary anchorage system will be used to reduce bridge erection time. Assume no preparation time for assembly site.

You have just 35 minutes to calculate time, troop, and equipment requirements before briefing your commander. Crossing and disassembly times can be calculated later. FM 5-34 is your reference for calculations.

See THE SCHOOL SOLUTION, page 44.

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1979 Readership Survey Results

As promised, the results of the 1979 Readership Survey are herein presented, along with some guarded editorial comments concerning their significance. Although this and similar surveys are subject to various interpretations by statistical experts, a few general conclusions are possible that most experts would accept.

Approximately 7,500 copies of the Winter edition of THE ENGINEER, containing the Readership Survey, were distributed to active Army engineer units/activities, the Reserve Components, training and education centers, facilities engineers, and numerous other activities and agencies worldwide.

As of 1 May, the cutoff date for purposes of evaluation and analysis, approximately 350 completed surveys had been returned, thus assuring at least a 90 percent confidence level. In other words, chances are nine out of ten that if we eventually receive another 350 returns, the results will be very similar, if not identical.

Without further elaboration, here are the questions and responses to each.

I. What is your present military status?

Response	No.	Percent
Active Army	186	55.0
USAR	70	20.7
National Guard	65	19.2
Retired	3	0.8
DAC	14	4.1

EDITOR'S COMMENT: These figures generally correlate to the magazine distribution pattern.

II. What is your present grade?

Response	Act. Army	Res. Comp.	% of Total
Company Grade Officer	62	38	30.3
Field Grade Officer	76	42	35.4
Warrant Officer	3	4	2.0
Junior Enlisted	12	10	6.8
Senior Enlisted	32	41	22.0

EDITOR'S COMMENT: Approximately two-thirds of the magazine readership is officer personnel, despite the fact that enlisted personnel outnumber officers within the Army and the Corps of Engineers. We're not sure why more enlisted personnel do not read the magazine, but we want to encourage commanders at all levels to insure that all of their troops have an opportunity to read it. If commanders feel their units are not receiving a sufficient quantity of magazines, they should request additional copies.

III. What is your present assignment?

Response	No.	Percent
Combat Engr. Unit	124	36.5
Bridging Unit	9	2.6
Topographic Unit	10	2.9
Construction unit	34	10.0
Facilities Engr.	20	5.8
Staff Section	22	6.4
School (ROTC, Service school, etc.)	57	16.8
Other	63	18.5

EDITOR'S COMMENT: The question was poorly worded, since there are no construction units, as such, and since readers who marked "school" may be assigned to the staff and faculty of the Engineer School, or they may be students attending one school or another. The only logical conclusion, then, is that many of our readers are assigned to combat engineer units. But, by the same token, many are assigned to other units/activities.

IV. How much formal education do you have?

Response	No.	Percent
Less than High School graduate	2	0.5
High School graduate or GED	46	13.6
Some college	56	16.5
Undergraduate degree	104	30.7
Graduate degree	130	38.4

V. How do you receive THE ENGINEER Magazine?

Response	No.	Percent
Personal Subscription	19	5.5
Unit/Office copy	295	86.7
Dayroom	7	2.0
Library	2	0.5
Other	17	5.0

EDITOR'S COMMENT: Most of our readers have access to a unit/office copy of the magazine, but we were surprised and disappointed that only two percent of respondents mentioned dayroom copies. It raises doubt that sufficient copies of the magazine are placed in dayroom racks where a majority of our junior enlisted troops should have the opportunity to read it.

VI. How much of the magazine do you usually read?

Response	No.	Percent
All of it, from cover to cover	122	36.2
Most of it	190	56.3
Less than half of it	25	7.4
Seldom read any of it	0	0.0

VII. What material do you enjoy most *in 'THE ENGINEER?*

Response	Act. Army	Res. Comp.	Total
Feature Articles	28.9%	25.1%	28.0%
News & Notes	18.3	15.8	17.4
Officer Career Info	18.5	7.8	13.1
Tactical Problem	8.9	13.7	10.8
Reserve Components	4.3	17.0	10.0
Enlisted Career Info	8.7	5.4	7.0
Letters to the Editor	5.7	7.1	6.5
NCO Channels	5.7	6.3	5.9
Other	0.3	1.4	0.8

EDITOR'S COMMENT: Based on the grade structure of our readership, we expected better response to "Enlisted Career Info" and "NCO Channels."

VIII. Rate the following magazine characteristics by placing a number beside each (1=outstanding, 2=average, 3=poor).

Response	Average Rating
Reading ease	1.4
Layout and design	1.5
Photos and illustrations	1.6

EDITOR'S COMMENT: We agree that the magazine needs improvement in the area of photos and illustrations, but in most cases, we must rely on contributors for both the quantity and quality of photos and artwork.

IX. Overall, how do you rate the information presented in THE ENGINEER?

Response	Percent of Total
Highly useful	43.2
Moderately useful	53.2
Slightly useful	3.2
Useless	0.0

EDITOR'S COMMENT: A most gratifying response. Obviously, the magazine performs a useful function. We hope to make it even more useful in the future.

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X. How do you rate THE ENGINEER in comparison with similar military publications?

Response	Percent
Better than most I've seen	49.7
About the same as others	42.3
Not as good as others I've seen	7.9

EDITOR'S COMMENT: These responses indicate that we're making progress in efforts to upgrade the magazine content and design.

XI. Would you like to see more space devoted to:

Response	Percent of Total
Equipment	20.8
Tactics	17.5
Foreign Armies and equipment	16.7
Career management info	12.9
General military subjects	12.1
History	9.6
Photos and art	5.0
Humor	2.5
Other	2.5

EDITOR'S COMMENT: Perhaps the most useful question in the entire survey. We will strive to devote more space to those subjects that attract the most interest.

XII. After reading THE ENGINEER, do you:

Response	No.	Percent of Total
Pass it on to someone else	198	59.8
Keep it for reference	126	38.0
Throw it away	7	2.1

EDITOR'S COMMENT: Since distribution of the magazine is currently limited to a ratio of one magazine per eight members of the entire Army engineer family, these responses were somewhat disappointing. Give others an opportunity to read the magazine before filing it away or throwing it in the trash can.

XIII. Would you be interested in contributing to THE ENGINEER?

Response	Percent of Total
Feature material	33.4
Short news items	29.7
Letters to the Editor	13.3
Photos or illustrations	19.2
Other	4.1

EDITOR'S COMMENT: If you have something interesting and useful to contribute, don't wait for a personal invitation. There can be no monetary reward for your time and effort, just the satisfaction of getting your thoughts and ideas into print and, perhaps, a pat on the back from your commander.

The final question on the survey was not a question at all, but simply a request for additional comments. Roughly one-third of those who completed the survey penciled in a suggestion, idea, constructive criticism, praise, etc. Some of the comments were published in the Spring edition of the magazine.

There is no way we can respond to all of the comments, but rest assued that all have been read and studied with an open mind and that many of your ideas and suggestions have already been acted upon, while others are under consideration for action.

A final word about the survey: Those readers who responded to the survey have taken an active role in establishing the editorial policy of their professional journal and we encourage their continued active participation. Readers who failed to respond for one reason or another may still do so, in any format desired. Pencil and scratch paper will do just fine.

ENGINEER

Magazine is now available by subscription. Requests for personal subscriptions should be forwarded to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, along with check or money order payable to the Superintendent of Documents. Subscription rates are $5.50 per year domestic (including FPO and APO) addresses and $6.90 for foreign addresses. Individual copies are available at $3.25 domestic and $4.10 foreign.

Challenges to Engineer Doctrine

by MAJ Stephen E. Draper

U.S. ARMY tactical doctrine has increased the importance of the Engineer in support of combat operations, resulting in the emergence of new Engineer doctrine.

Innovations of the new tactics are based on the age-old partnership of fire and maneuver within the context of new weapons systems. The new weapons and the new tactics have envolved from the increasing imbalance between NATO and Warsaw Pact conventional forces. In Europe, NATO forces are outnumbred 2.6 to 1 in tanks and 2 to 1 in aircraft, and since Warsaw Pact forces can choose the time and place of attack, combat ratios as great as 8 to 1 could favor the enemy in the area of the main attack.

An analysis of our new doctrine is necessary to describe the requirements for winning in such an environment.

The doctrine of the Active Defense is based on three facts of the modern battlefield. First, the new generation of weapons systems has dramatically increased the defender's combat power and his ability to accurately deliver that power. If an enemy tank can be seen for a period of less than one minute, it can be hit with some sort of weapon. Once hit, the probability of a mobility "kill" is incredibly high, on the order of 90 percent.

Second, the growing imbalance between NATO forces and those of the Warsaw Pact may require NATO to fight against odds as great as 8 to 1.

Third, future war in Europe is expected to be brief, with the enemy attempting to destroy NATO's ability to fight quickly, thus forcing political settlement rather than a protracted or nuclear war.

SINCE WE do not have enough combat power to place sufficient combat power forward and also to maintain a strong reserve, the Active Defense concept of the new tactics calls for maximum forward deployment with minimum reserves. The intent is to slow the enemy advance. The scarcity of resources requires that sectors be occupied in a manner that accepts risk in all areas except likely avenues of approach.

The enemy emphasizes momentum and is tank-oriented. The Active Defense seeks to disrupt enemy armor thrusts, slow him to a crawl, and provide enough time for reinforcement from CONUS. The bottom line is to kill tanks, and to kill them well forward on the battlefield.

The new tactical doctrine is based on the following six maxims:

(1) We must understand the enemy;

(2) We must obtain accurate and timely battlefield intelligence, including information on terrain, weather, and climate as well as enemy order of battle;

(3) We must concentrate our forces at the critical times and places and be willing to accept risk in other less critical areas;

(4) We must fight as a combined arms team;

(5) We must exploit inherent advantages of the defender;

(6) We must use fire and maneuver to slow the enemy advance.

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Two new technical systems make the Active Defense feasible. One is the family of anti-armor missiles and the other is the family of scatterable mines (FASCAM).

The most important of the anti-armor missiles is the TOW. It is described as ". . . a vehicle-mounted or crew portable, heavy anti-tank assault weapon . . . tube launched, wire-command link guided missile . . . capable of defeating any known vehicle on the battlefield . . ."

The TOW is complemented by the family of scatterable mines as a tank-killing system. These mines can be rapidly emplaced and programmed to self-destruct after a specified time period. FASCAM consists of six different systems, described briefly below.

(1) The Helicopter Delivered Mine System, M-56, employing the M-34 HE mine. Up to 160 mines are carried by each UH-1H helicopter.

(2) The Artillery Delivered Anti-Personnel Mine System (ADAM), employing the M-67 or M-76 mine. A large number of mines are carried by each 155-mm projectile.

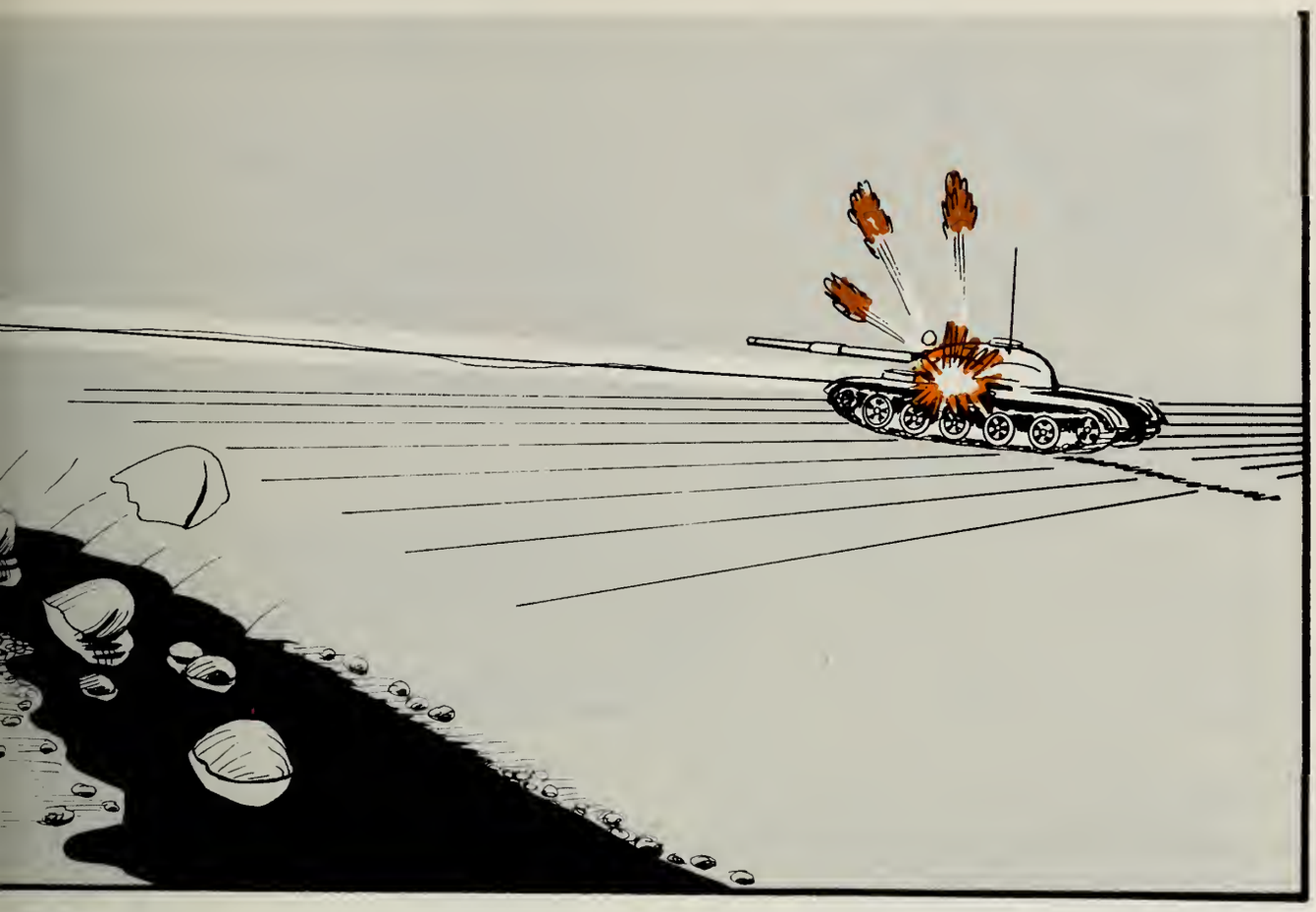
(3) The Artillery Delivered Anti-Tank Mine System (ADATM), employing the XM-70 or XM-73 AT mines and delivered by 155-mm projectile.

(4) The Ground Emplaced Mine Scattering System, employing the XM-75 AT mine and the XM-74 AP mine. Mines are delivered by the XM-128 mine dispenser, which will scatter mines in one of several preplanned patterns.

(5) The "Gator" Mine System employs BLU 91/B AT and BLU 92/B AP mines which are delivered by high-performance Air Force, Navy, and Marine Corps aircraft.

(6) The Modular Pack Mine System (MOPMS), employing AT and AP mines similar to the GEMSS system. The mines are tube-launched from a factory-set, disposable ejection tube.

Of the six scatterable mine systems mentioned, only the Helicopter Delivered Mine System has



been fielded. Fielding of the other five systems is expected in the early 1980s.

General conclusions may be drawn from the application of our new technology to a realistic combat scenario. The first conclusion is that the major constraint to TOW tank kills is the large time periods required between the firing of rounds to allow for tracking.

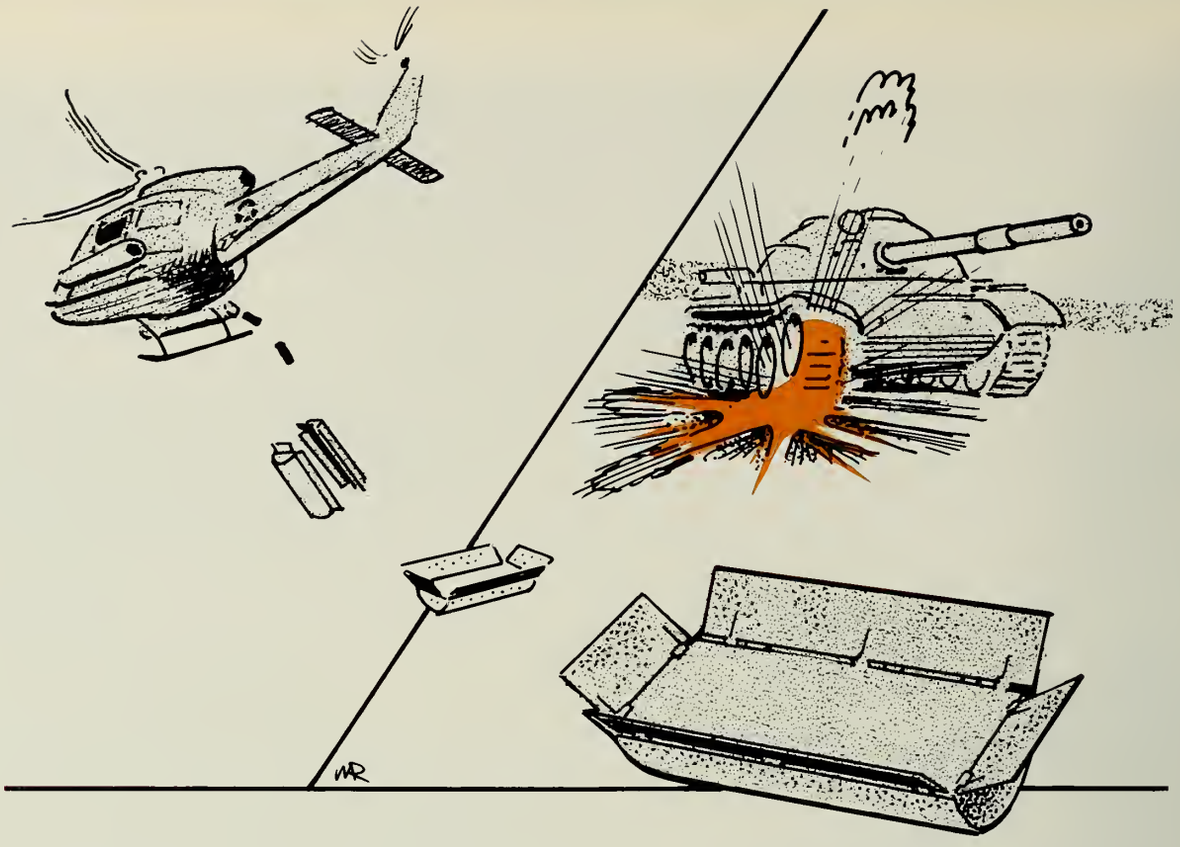
THE SECOND conclusion is that any increase in the total number of kills is directly related to mobility and countermobility. By decreasing the amount of time required to move between TOW positions, more rounds can be fired in any given time period. By decreasing the enemy's approach speed, more rounds can be fired in the same time period. Mobility and countermobility are the keys to optimum TOW weapons use.

Decreasing the enemy's mobility has traditionally been an engineer task, and it is accomplished by the creation of obstacles. In a "bowling alley" situation, the TOW squad's projected kills can be almost doubled by cutting the approach speed in half. In the case of a task force under suppressive fire, decreasing the enemy's speed of approach by one-half would increase projected kills substantially.

The most effective way to decrease enemy approach speed is to create effective obstacles. The ability to provide effective obstacles at the right place at the right time will soon be possible with FASCAM, which gives the ability to rapidly emplace preplanned minefields or fire immediate obstacles as the enemy situation develops.

The probability of success can also be enhanced by applying more combat power at a given location. Two TOW squads working as a team have almost twice the chance of success against an armored approach as one TOW squad working alone. The shifting of combat resources to critical sectors cannot rely solely on existing lateral transportation arteries. Engineer effort must also be directed to this task.

The engineer must be concerned with three



critical tasks. First, he must enhance friendly mobility and inhibit enemy mobility. Second, he must increase the effect of friendly firepower and decrease the effects of enemy firepower. The effectiveness of friendly firepower is increased by careful placement of obstacles within a designated killing zone, along with the placement of obstacles that channel the enemy to that zone. Enemy firepower effectiveness can be reduced by the construction of covered routes between positions and by fortification of those positions.

Third, the engineer must be prepared to fight as infantry, thus freeing maneuver forces to conduct an Active Defense. The higher densities of combat power must be placed where the greatest threat exists. At critical points in the battle, such as when maneuver brigades have been backed up to their rear boundaries, engineer units might be used to replace maneuver units in risk areas so that more combat power can be applied against the enemy's main attack.

ENHANCEMENT of friendly mobility can be achieved on two levels. On the micro-level, construction of covered routes between weapons positions within a battle zone and construction of routes of movement to new battle zones are an obvious means of increasing combat power for the company and battalion. On the macro-level, avenues of maneuver to allow rapid lateral shifting of combat power between brigades will directly enhance success at critical times in the battle.

These routes should have the following characteristics:

—They should be as short as possible within the constraints of the requirement for 300 meters between positions, allowing for minimum travel time between positions.

—They should allow the maximum possible speed for the tank, APC, or truck. This will require, in some areas, grubbing, grading, and some rudimentary base work to provide better traction.

—They should be covered and concealed, taking advantage of terrain masking, etc.

—They should be constructed in such a manner as to facilitate the "overwatch" tactics used by armored/mechanized forces.

The construction of avenues of lateral reinforcement is an extemely important engineer task, second only to the creation of obstacles. The division commander will initially allocate combat power to counter the major threat. Therefore, those sectors with the greatest possibility of enemy attack will be assigned the greatest combat power.

Other areas will have a smaller density. The enemy will most likely attack in a configuration that makes the initial allocation sub-optimum. Lateral shifting of maneuver units will be needed to achieve optimization. This can be done only if the avenues are prepared so they are passable,

easily maintained, and covered from enemy air observation.

The enemy must be slowed and channelized into killing zones that allow maximum effectiveness of weapons systems. Obstacles of every sort must be placed so that, upon reaching them, his momentum is reduced and he chooses the route that leads to the killing zone. Once he is in that zone, he must be slowed further and held for short periods to allow our anti-armor weapons the time to fire as many rounds as possible. The obstacles must be placed so that the enemy vehicle remains in view of the friendly weapons for as long as possible.

FRIENDLY ANTI-ARMOR weapons must bear an increasing burden of enemy fire suppression as the battle progresses. These weapons systems will require some sort of protection from counter-fire. The minimum essential protection is a position that allows exposure of only main gun or firing platform. A position with overhead cover is desireable.

Additional protective positions will have to be constructed that are not directly related to maneuver units, however. These will also require engineer resources. While the maneuver units can provide their own protective positions to some extent, it will be entirely up to the engineer to provide positions for a variety of command posts, artillery emplacements, aviation assets, communications sites, and various logistical units and equipment parks needed by the division.

All of the above require the engineer's attention and should be the first priority. There are, however, other tasks that must be accomplished and these will require engineer assets. Such tasks will include supporting river crossings, water supply, rear area damage control, and rear area security.

To accomplish these tasks, a limited amount of divisional engineer resources exist. It is obvious that the divisional commander must optimize these rsources just as he must optimize combat power.

Current doctrine places an engineer company in direct support to a maneuver brigade (FM 5-100). Further distribution, such as the practice of placing one engineer platoon in direct support of each maneuver battalion task force, has a tendency to be wasteful. The need for engineer resources is situation-dependent and varies with the expected threat, the terrain configuration, the defensive unit's organization, etc. Usually, the platoon is located with the supported battalion for the period of the battle, and there it stays, even if no work is required or if only a portion of the platoon's assets are used.

The resource allocation problem in Europe is critical. Given 48 hours warning, the current divisional engineer organization permits each brigade to receive the following:

—36 "standard" minefields (100m X 50m)
—1200 meters of "standard" anti-tank ditch (3m X 2m)
—60 small bridges destroyed or 60 road craters
—36 "vehicle pits" for anti-tank weapons positions
—90 Abatis or other obstacles.

The fourth company of the battalion will most likely be assigned to the covering force to provide the same sort of services, with more emphasis placed on the construction of covered withdrawal routes. Thus, the Corps engineer battalion must provide the division with lateral avenues of reinforcement as well as the engineer work needed by the artillery, aviation unit, DISCOM, etc. This battalion can construct approximately 14 kilometers of new road if it does nothing else in the 48-hour period. With all other demands being filled, the end result is that lateral transportation work will be minimal.

IN CONCLUSION, more effective use of our engineer units is possible if they are allocated on a task basis rather than on a unit basis. At the very least, engineer resources should be allocated in the same percentages that the threat presents. Better yet, engineers might be allocated in terms of the needs of the three areas discussed above—friendly mobility enhancement, enemy mobility reduction, and protective fortifications.

From the point of view of the division commander, the overriding concern will be to restructure combat power in the most effective way once enemy intentions are known. By using engineers to enhance the ability to rapidly shift combat power to critical areas, the commander is able to optimize available combat power.

From the point of view of the brigade commander, the optimum use of engineers lies in the preparation of movement routes and routes of lateral reinforcement that allow a balancing of combat power against the enemy threat.

From the point of view of battalion and company commanders, engineers can best be used in the role of countermobility. They will be interested in channelizing enemy vehicles into killing zones and slowing enemy movement within those zones.

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The new concept of habitually placing at least one Corps engineer battalion OPCON to each division can help alleviate the problem of scare engineer resources. If, by TO&E mission assignment, the Corps battalion is made responsible for all engineer tasks behind the brigade rear boundaries, the divisional battalion can be solely tasked and trained for the three major acitvities for which the Active Defense calls.

By TO&E, the Corps battalion should be responsible for MSRs, water supply, communication sites, aircraft landing areas, and all those requirements not associated with direct application of combat power. The divisional battalion would be responsible, by TO&E, only for the tasks specifically involved with friendly mobility enhancement, enemy mobility reduction, and maneuver unit survival. This would require some basic organizational changes within each battalion, as well as some basic TO&E equipment changes (such as adding more D-7s, front-end loaders, and augurs) in order to provide full effectiveness.

AN ALTERNATIVE would be to provide an engineer company team to each brigade. This company would be solely directed at those mobility tasks inherent to the brigade and its battalions. The type and number of subunits attached to the team would be based on the brigade's mission and the threat presented, much like a maneuver company support team. It would be provided with the equipment necessary to support the brigade with obstacle construction, fortifications, and minimal road construction capability.

The reduced divisional battalion could then be solely concerned with accomplishing division-level tasks without competition from brigade requirements. This alternative would, of course, be in keeping with the fact that it is a brigade commander's war, but it would be inefficient from a training and management standpoint.

The concepts of how engineers are used once the battle begins can be changed to provide the division with more effective use of its combat power. As the division commander moves part of his force from one sector to another, he must somehow allow for "holes" created.

There is a point in the battle in which engineers would provide maximum optimization, not by creating obstacles to the rear, but by converting to infantry and covering "risk" sectors. This point certainly exists when a brigade is backed up to its rear boundary by a strong enemy thrust. Then the engineers can be used optimally by replacing a unit in a "risk" area so the maneuver unit can be shifted to reinforce the battered brigade. It should be noted that, with minimal antitank weapons augmentation, the engineer unit can provide excellent defense in an urban area.

TO SUMMARIZE, just as tactical doctrine has changed drastically, so must engineer doctrine. Engineers cannot be used on the battlefield of the future as they were used in World War II and Vietnam. The threat demands that the resource be used as effectively as possible or decisive defeat is probable.

It is interesting to note that the Russians perceive the engineer resource with increasing importance. There exists today, in the Soviet Army, a Mobile Obstacle Detachment which operates with the antitank reserve. Its purpose, according to A.A. Siderenko, "is to set up minefields on identified axes of counter attacks by enemy tanks and to destroy objectives (bridges, road junctions, defiles, etc.) to the front and flanks of the deployed antitank reserve . . . The presence of a Mobile Obstacle Detachment permits rapid mining in the course of combat . . . Mining the terrain delays the advance of the enemy tanks and thus creates conditions for their effective destruction by the fire of the antitank reserve." This would be an excellent description of the brigade engineer combat team.

One concept that has been reviewed for the heavy division structure is the reduction of the engineer battalion to three companies. It was shown to be a step in the wrong direction and is no longer being considered. Notwithstanding the fact that the German Army had only three companies per division in World War II, modern technology and the Active Defense demand more.

The trend from 1746 through Vietnam has been to direct engineer efforts away from combat roles towards combat service support roles. That trend must be reversed. No longer will conventional war allow us the time to build-up and reinforce. The effort can no longer be on the MSRs and logistics "tail." It must be directed at maximizing combat power at the outset. The concepts of how engineers are used must be changed to emphasize those tasks that directly affect fire and maneuver of our forward units.

Major Draper is currently assigned to the 78th Engineer Battalion (C), USAREUR. He wrote this article while attending the Command and General Staff College.

by CPT Harry N. Hambric

MGB: Myths and Misunderstandings

In recent months, numerous questions have appeared concerning the feasibility and capability of the Medium Girder Bridge (MGB), in comparison to other U.S. dry gap tactical and assault bridging.

In an effort to clear up as many of these myths and misunderstandings as possible, I have compiled the following "Myths and Truths" chart.

MYTH NO. 1

The MGB is limited to a maximum of MLC 60 loads.

TRUTH

Studies conducted by the Marine and Bridge Laboratory, Mobility Equipment Research and Development Command (MERADCOM), indicate that the MGB can safely cross loads heavier than MLC 60 on a vehicle-by-vehicle basis. MERADCOM and its equivalent agency in England are coordinating efforts to determine the relationship between bridge lengths and the maximum safe load of specific vehicles that each length can sustain. Current data reveal that the MLC 78 HET loaded with a M-60 tank will be able to cross double story MGBs with gaps up to 94 feet wide and single story MGBs with gaps up to 30 feet wide.

MYTH NO. 2

MLC 60 length is limited to 103 feet, with no capability within existing equipment to reinforce.

TRUTH

MGBs up to 163 feet (49 meters) in length can be reinforced to MLC 60 with the U.S. cable reinforcement set (upon its arrival, 1980-81). However, it has been determined that, very likely, single span MGBs may be installed over a pier. Data concerning exact lengths and procedures for installing single span MGBs in this manner were not available for inclusion in this article. Further testing of the concept will be forthcoming in the near future, and data forwarded to using units.

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MYTH NO. 3

Limited life of the MGB may affect training and operation readiness of the bridge.

TRUTH

The aluminum alloy has a well-defined fatigue life of 10,000 Class 60 crossings. The fatigue life of the bridge is not affected by training builds unless crossed by Class 60 or heavier loads. The launching components (rollers, launching nose, etc.) will be affected by training builds, but this is the case with any other bridge launching system as well. Fair wear and tear, or accidents (improper procedures) may produce worn or damaged components, but careful handling and use of established procedures will limit damage and wear to very minor degrees. The chances of a tactical bridge sustaining even 1,000 MLC 60 crossings in a combat zone without being detected (and put out of action) are slim, indeed. Ten thousand crossing cycles would appear to be more than sufficient.

NOTE: The same MGB sets were subjected to developmental and operational tests, not only on the MGB, but on the erection set, the United Kingdom pier and span junction sets, and the U.S. cable reinforcement set. The two sets have never experienced any type of catastrophic failure. Approximately 12,000 Class 60 crossings, plus several deliberate static loads approaching 90 tons, did not cause failures. To obtain loading conditions where the "10,000 MLC 60" criteria may cause failure, the components would have to be in the same location for every MLC 60 crossing. This is not likely due to disassembly and relocation, as well as mixing, of components.

MYTH NO. 4

Limited replacement parts will affect readiness and/or combat operations.

TRUTH

The U.S. has purchased only 34 sets of MGB and 17 erection sets. All MGB units in the Army, except one, will have four MGBs and two erection sets. Each bridge and erection set has a minimum of one spare for each of the major components, more than one spare for items considered to be subject to high mortality. Each unit will have sufficient spare parts to replace up to two complete ends of bridge, four interior bays, and any damaged erection component without interfering with the capability of the set. High mortality components have been identified and are being prestocked in depots in addition to spares already included in bridge sets.

MYTH NO. 5

The flexibility of MGB has been referred to as rigid, while the Bailey is classified as highly flexible.

TRUTH

When used as a bridge (the intended purpose), the MGB is far more flexible than the Bailey. Numerous methods exist for jacking the bridge onto/off its rollers; little, if any, site preparation is required; up to 1:10 transverse slopes and 1:10 longitudinal slopes are available; numerous methods exist for expediting launch and de-launch; because of its light weight and quick, easy assembly, new and better ways to employ the MGB should be developed through field experience.

MYTH NO. 6

The cost of MGB is prohibitive.

TRUTH

The MGB is expensive, costing approximately $3,800 per foot, compared with an acquisition cost for the Bailey Bridge of $270 per foot 20 to 30 years ago. Even considering inflation, the difference is significant. But considering the savings in time, personnel, and equipment on the future battlefield, the MGB is expected to pay for itself. The MGB is a bridge which can be launched almost as fast during blackout conditions, in adverse weather, in fog, or in smoke as it can be launched on a clear day. A 103-foot MLC MGB can be launched in less than two hours, and de-launched and disassembled in the same period of time.

MYTH NO. 7

MGB used in the forward part of the main battle area has been referred to as ludicrous.

TRUTH

I am sure that no engineer with common sense would want to build a bridge in the forward portion of any battlefield, but it would be difficult to assure me that (if I were the commander of an MGB company) I would never be called upon to complement other forms of assault bridging if the situation required it. Until the late 1980s, MGB will be our fastest bridging system for gaps greater than 60 feet. I would certainly want to get in, and get out as fast as I could. MGB will be well worth its cost in time of war.

It has been suggested that perhaps MGB and Bailey Bridge assets should be consolidated in composite MGB/Bailey Bridge companies. I hope that this does not happen. There is no doubt that MGB and Bailey must complement each other, and I certainly agree that taking advantage of each system's strong points will provide optimum utilization of bridging assets.

I strongly feel that, even if a company could maintain the readiness and training required to field two different types of bridge, the command and control of elements located in brigade areas of operation, as well as back in the Corps LOC, would prove to be an almost impossible task for the unit.

Leave the TO&Es as they are, and continue to allow the two bridges to complement each other, rather than compete with each other.

The information provided above is by no means complete, nor is it all inclusive. I have only touched the surface of several areas concerning MGB which seem to be misunderstood. I hope some of the misconcepts and misunderstandings have been cleared up.

The MGB is here! We must approach it with an open mind and a positive manner. The fact that there are so few sets of MGB in our inventory (34) means that we must optimize their use. Testing of the MGB has proven beyond any doubt that it can do the job, and even now there are numerous studies and proposals for using it to an even greater advantage.

The MGB, like the Bailey, began as a simple bridge, but through input from research and development agencies, as well as field users, more and more uses will be found until, perhaps some day, we can give it the same label that the Bailey has worn for so many years—"in a class of its own."

Captain Hambric is presently assigned to the U.S. Army Mobility Equipment Research and Development Command as Research and Development Coordinator for the Bridge and Structures Division, Marine and Bridge Laboratory. He has been involved with the Medium Girder Bridge program since 1976 and is considered the Army's leading authority on MGB operations.

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Contingency Missions

a prerequisite for effective reserve components training

by COL Everett R. Thomas

CURRENT emphasis in training is on preparedness to win the first battle of the next war against numerically superior Warsaw Pact forces attacking across Central Europe. Required to support combined arms task forces will be more combat engineer units than have ever been employed in U.S. history. Since 70 percent of combat engineer units in the Total Army are Reseve Components, the readiness posture of these units is critical to victory on the battlefield.

However, due to time restrictions, high personnel turnover, the lack of training facilities, wide dispersal of engineer units, and a lack of technical expertise, many Reserve Component (RC) engineer organizations are ill-prepared for early deployment to the European battlefield.

Army training philosophy dictates that units master all Army Training and Evaluation Program (ARTEP) tasks and that individuals perform all Soldiers Manual tasks for their Military Occupational Speciality. But, RC engineer battalions are, in fact, training on a limited number of ARTEP tasks, and individuals are mastering very few Soldiers Manual tasks. The result is a host of poorly trained engineer units which will require extensive post-mobilization training before deployment to any contingency area.

Presently, only engineer groups and higher headquarters have contingency missions. Since battalions are the focal point of training management, they should be assigned specific contingency missions as a basis for training. Only then can battalion commanders assign realistic individual and collective training priorities.

As described in Training Circular 21-5-7, the restrictions placed on our Reserve Components have a pronounced effect on their ability to follow the Army's "training in units" concept. Of these restrictions, time has the greatest impact. The commander has just 38 days each year to insure that individuals are job-qualified, and that squads and larger units are functioning as responsive, integrated teams.

IN ADDITION to mission-essential training, each organization must also recruit, perform community service projects, maintain equipment, prepare for annual General Inspections and Command Inspections, conduct civil disturbance training, and satisfy an increasing number of administrative requirements. There is insufficient time to meet these requirements, to train on more than 100 battalion and lower level ARTEP tasks, and to qualify on all the Soldiers Manual tasks.

A second factor affecting training is the high annual turnover in personnel. Many units are experiencing rates in excess of 33 percent, some as high as 50 percent. The addition of new soldiers to be trained and the need to develop small unit teamwork lost by the rotation of leaders has placed added burdens on the commander. Also, constant changing of key personnel contributes to a loss of continuity in training programs. High turnover has a substantial negative impact on RC readiness.

Lack of training areas close to Reserve Components engineer units is a third restriction. To train realistically, engineers must construct an obstacle, install a minefield, dig an antitank ditch, and detonate a charge at the training site. Presently, most units must travel great distances to find a weekend training site or must defer these activities to the two weeks of Annual Training.

SIMULATION games, sub-caliber devices, and equipment models help alleviate the problem, but their use results in a loss of realism. By holding the commander responsible for a limited number of ARTEP tasks, he can develop training facilities locally and recommend an appropriate Annual Training location.

Another geographical restriction to training is the wide dispersal of RC engineer units. Not only are companies separated from one another by many miles, but companies, themselves, are frequently split into two or more different locations. Commanders waste precious time traveling from one unit to another. Platoons must convoy to distant locations for company field training exercises, only to turn around and return home after just a few hours of training. Great distances between units, then, is another factor affecting RC readiness.

A fifth and very serious detriment to mission-related training is the lack of technical expertise among both officers and noncommissioned officers. The principal causes of the deficiency are a lack of time for individual training and the constant redesignation of units from one branch of service to another. It is not unusual to find officers or NCOs who have served in three or more branches. Although many dedicated reservists devote their own time to branch qualification, they cannot keep up with rapidly changing doctrine and with the ever-increasing technical demands on engineer unit leaders.

The restrictions of time, personnel turnover, lack of training facilities, wide unit dispersal, and lack of technical expertise force the commander to carefully identify his missions before determining which ARTEP tasks to include in his training program. It is imperative that RC combat engineer battalions be included in contingency planning by assigning areas of operation, anticipated missions, and a unit to support.

ONCE HE HAS a contingency mission, the commander can tailor his command post and field training exercises to the characteristics of the contingency area. Engineers and the supported unit can exchange standing operating procedures, maps, and terrain studies. The contingency mission forms the basis for a critical ARTEP task list, which, in turn, becomes the foundation of the yearly training program. Subsequently, the commander can determine from the ARTEP task list which combat engineer Soldiers Manual tasks are most critical to accomplishing ARTEP tasks and he can devise meaningful individual training programs.

Under present conditions, Reserve Components engineer battalions are required to perform too many individual and unit tasks. By the exclusion of these units from contingency planning, commanders are forced to speculate on which tasks are most critical. A solution to the dilemma is to give each battalion a mission to train toward.

The end result will be a combat ready unit capable of early deployment to one specific locale, rather than a poorly trained battalion requiring extensive post-mobilization training before deploying anywhere.

As General Bernard W. Rogers, Army Chief of Staff, stated two years ago, "The mission of today's Total Army is to maintain a state of readiness which provides an effective deterrent to aggression and which assures our ability to fight and win should deterrence fail."

Lieutenant Colonel Everett R. Thomas was the Engineer Team Chief, Readiness Group, Fort Knox when he wrote this article as a requirement of the Command and General Staff College correspondence course.

The "Fightin Fifth"

in

REFORGER 79

by MAJ Ronald D. Laux

REFORGER 79 for the Fifth Engineer Battalion began with a "duffel bag drag" during the early morning hours of 12 January 1979. The day began with an organized outprocess consisting of thirteen points where personnel filled out mail cards and baggage tags, weighed baggage, received briefings, and bid farewell to their friends and families.

The first flight departed at 2230 hours 13 January from Scott Air Force Base in 30-MPH winds and a -23° wind chill factor. The second flight departed under slightly worse conditions at 0230 hours 14 January and subsequent flights departed on schedlule. After refueling at McGuire Air Force Base, the journey resumed and 13 hours later the "Fightin Fifth" had landed at Ramstein Air Force Base, Germany.

As part of the REFORGER exercise, the 5th Engineer Battalion was scheduled to move to Miesau, where it would draw its entire supply of trucks, equipment, tools, tents, etc., in a nighttime issue from the 6th Combat Equipment Company (CEGE). It turned out to be one of the greatest challenges the battalion has ever faced. Working outside in severe weather conditions, jump-starting and repairing a high percentage of dump trucks, and moving all equipment to an unused snow-covered autobahn strip shared by five other units would have caused a less disciplined unit to succumb. But personnel of the Fifth Battalion met the

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EDITOR'S NOTE: This article does not attempt to present a complete overview of REFORGER 79, nor of a particular FTX. Rather, it is intended merely as a first-hand description of one CONUS-based engineer unit's participation in an almost unique Winter exercise. Hopefully, other units will benefit from the 5th Engineer Battalion's experience and lessons learned.

challenge head on, stuck together, and accomplished the task despite little or no sleep since their departure from CONUS.

The battalion was required to inventory and issue the consolidated property to each company within the next 72 hours. This was no simple task! The battalion S-4, who was the proud new owner of $6 million in equipment, had to redistribute it. The task could be accomplished only by finding an area large enough to off-load an entire engineer battalion and reissue in company quantities.

A reconnaissance was made and the Air Force's 86th Tactical Fighter Wing provided assistance in the form of a large open area next to the taxiway at Ramstein Air Force Base. Having never seen an entire combat engineer battalion spread out, the Air Force soon realized that the equipment could not remain in place with jet fighters preparing for takeoff within 100 feet of our dozers and trucks.

ONCE AGAIN the battalion was required to relocate before final inventories and property issues could be completed. On 22 January, the battalion received movement orders to begin its long road march to the exercise area. The two-day road march to Illesheim (the Major Unit Assembly Area) went well with only a small percentage of equipment requiring recovery. Excellent support was provided in route by the 21st Support Command military police and the 5th Maintenance Company.

At Illesheim, a base camp was erected and considerable maintenance effort was applied to all equipment to ensure its readiness for FTX "Certain Sentinel." At this point, the Fightin Fifth had its first opportunity to fully equip for combat. The five Milvans and the mobile TOC which were ship-

Ready and waiting at Scott Air Force Base hanger

Boarding C-141 at Scott for departure to Germany

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ped from Texas in mid-December were unloaded at the MUAA. Delays due to storms and off-loading of the 2d Brigade, 1st Cavalry Division, further delayed receipt of the battalion NAP (Not Authorized Preposition) equipment until after the MUAA.

Essential items such as tow bars, which were not issued from POMCUS stocks, were not available immediately upon arrival in Germany and this severely hampered recovery during movement to the MUAA. Radios, batteries, field desks, repair parts, SSSC items, locks, and tools were among the other items being shipped in the Milvans. At one point in time, a personal reconnaissance was made by the battalion commander, S-3, and S-4 to locate the Milvans at the railhead.

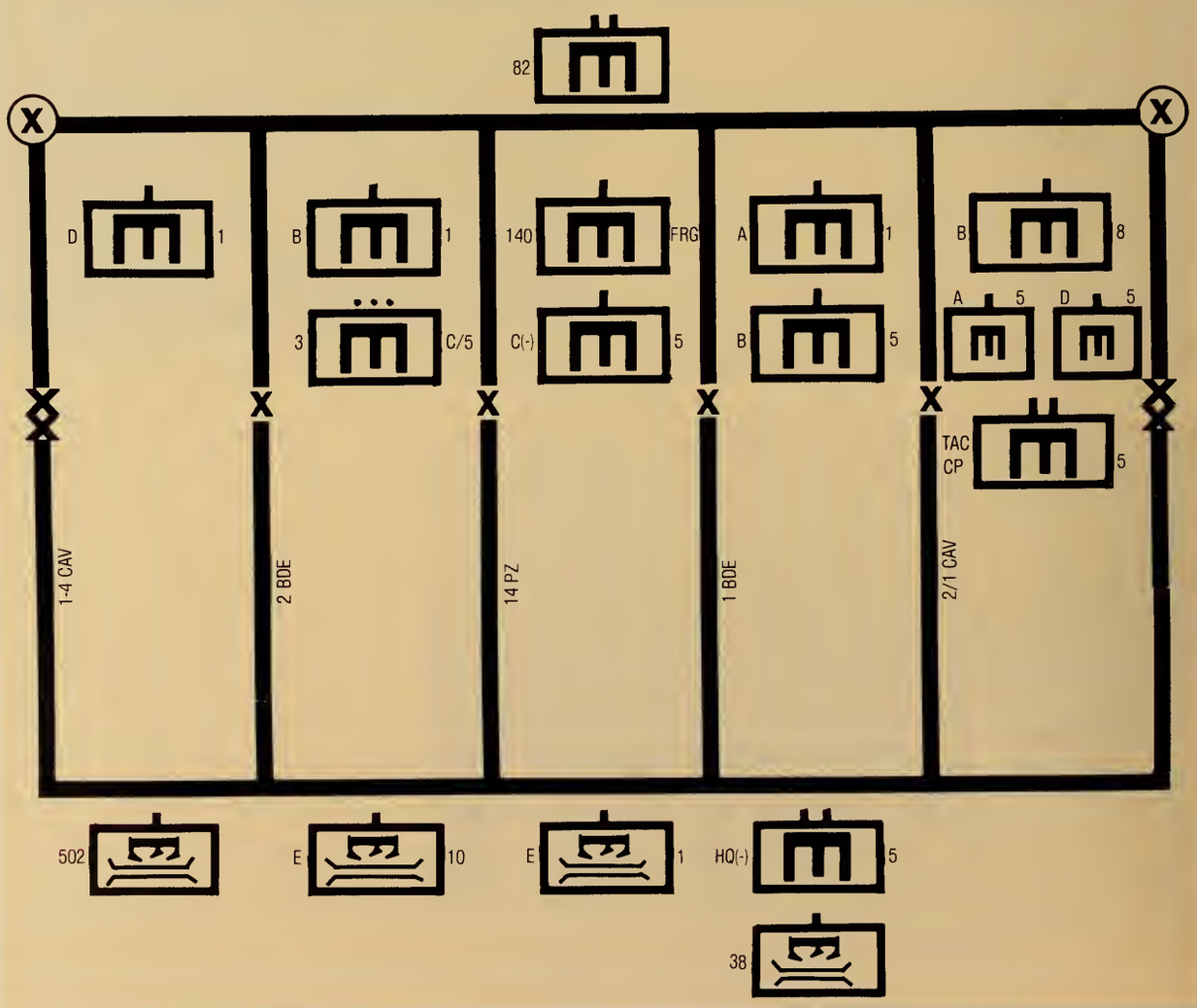
AT ILLESHEIM, units rapidly configured into combat ready units and prepared to link up with 1st Infantry and 1st Cavalry units. Extensive coordination was made with the 7th Engineer Brigade, the 1st Infantry Division, the DRS Brigade from the 1st Cavalry Division and all service support units. During this period, obstacle plans were reviewed and engineer support roles finalized.

Blue Forces included the 1st Infantry Division with a front consisting of five brigades on line with the 2d ACR as the covering force and the 3d Brigade, 1st Infantry Division (Forward) in reserve.

The 1st Engineer Battalion provided direct support to its normally associated brigades with D/1 supporting the 1-4 Cavalry on the west flank. B/8th Engineer Battalion, a 5-platoon engineer company, was to provide organic support to the 2d Bde, 1st Cavalry Division. The 5th Engineer Battalion was placed in a direct support role and was utilized as follows:

A and D companies with a forward TAC CP, formed an engineer task force in the 1st Cavalry area. B Company was in Direct Support to the 1st Brigade, 1st Infantry. C Company participated in the interoperability training with the 14th Panzer Brigade and its engineer company, the 140th Pioneer Company. For the first two days of the ex-

ENGINEER ORGANIZATION IN 1ST INFANTRY DIVISION AREA OF OPERATIONS



ercise, the 3d platoon of Company C was in Direct Support of the 2d Brigade, 1st Infantry. Attached to the 5th Engineer Battalion was the 38th Medium Girder Bridge Company. The 502d Ribbon Brigade Company and E Company of the 10th Engineer Battalion remained in General Support under 7th Engineer Brigade control. Covering force engineer support was provided by the 82d Engineer Battalion.

As time for the exercise approached, line units of the 5th Engineer Battalion moved out to link up with assigned units. The battalion moved to a wooded hilltop south of Illesheim and prepared for the war. As the threat of Orange Forces activity became more apparent, certain preparation actions were permitted and Class V was drawn from PSPs and ASPs. To accomplish this ammunition haul without assistance would have been extremely difficult, since most vehicles were squad dump trucks.

THEREFORE, a decision was made to ground the bridge from the 38th MGB Company and use its trucks for hauling all Class V to support the engineer task force in the 1st Cavalry sector. All other units were receiving ammunition from the brigades they were supporting. The trade off of grounding the bridge for Class V haul proved successful. As soon as sufficient Class V was prestocked forward to support obstacle plans, one set of MGB was uploaded for a quick response to any bridge mission while the 2d platoon of the 38th MGB Company continued Class V resupply.

The actual start of the FTX for engineers began prior to the Orange Force attack. The 5th Engineers, as well as all other engineers, were actively involved in obstacle preparation to support the Blue Force defensive phase of "Certain Sentinal."

However, complications including extensive delays in shipping 1st Cavalry Division equipment to the port of embarkation, improper rail loading for shipment to VII Corps, and lack of unit integrity in rail shipments, caused significant delays for the 1st Cav and organic engineers. These problems caused the eastern flank to be insufficiently equipped and manned to defend against Orange Forces, which were familiar with the terrain and already had units deployed and poised for the attack.

Due to the late arrival of the 2d Bde, 1st Cav Div, the 5th Engineer Battalion task force found itself forward of the FEBA emplacing obstacles in the first belt, a zone previously assigned to B/8th Engineers.

Working around the clock, engineers placed 90 unexecuted obstacles in the 1st Cav sector prior to

Movement by autobahn to MUAA

LT Mark Setman of A Company stocks up on C-rations

LTC Atkinson (left) briefs BG Watts, the acting C G of the 21st Support Command, and MAJ Newman, commander of the 6th CEGE Company

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the Orange Forces breakthrough. Similar numbers of obstacles were emplaced in other sectors. The Fightin Fifth and other Direct Support engineers conceived a good scheme for delaying the Orange Forces.

However, a major problem in execution surfaced which proved to be a serious training deficiency. Although 90 obstacles were prepared in the 1st Cav Sector, only a very small fraction were ever turned over to 1st Cav maneuver units. Among those turned over, only about 10 percent were executed.

This serious problem in target turnover and target execution, combined with the late arrival of the 1st Cavalry DRS brigade, left the eastern flank extremely vulnerable to Orange Force penetration. The 5th Engineer Battalion task force found itself being rapidly attrited due to the requirement to guard unexecuted targets after emplacement. This prevented the emplacement of obstacles in depth as previously planned.

Therefore, Orange Forces faced a thin belt of unexecuted obstacles with a partially effective maneuver brigade to defend in zone. Th Orange thrust consisted of a diversionary attack in the west, followed by a withdrawal and night rail move to the east flank where the major attack took place with Highway 470 being the main axis of advance.

Compounding the problem was the fact that the main Orange advance (Hwy 470) fell upon the boundary line between the DRS brigade and the 1st Bde, 1st Infantry. As a result, Orange penetration was rapid and almost unobstructed. The third day of the exercise found A Co, 5th Engineer Battalion and four tanks against the Orange thrust spearheaded by an armored brigade. A day later, A Company was reconstituted and back in the exercise.

AS A RESULT of the rapid Orange Forces advance, Blue Forces on the eastern flank were continuously withdrawing and fighting a delaying action in order to shift forces to blunt the Orange penetration. The 5th Engineer Battalion TAC CP relocated five times to remain with the DRS Brigade headquarters and the 5th's main CP relocated three times.

The FEBA was held in sector by the 14th Panzer Brigade, which refused to yield ground or accept penetration. Problems of target turnover and target execution did not exist in the 14th Panzer Brigade. Obstacles were planned well in advance. Like clockwork, the maneuver unit shows up, takes over the targets from the engineers, and executes them when the maneuver plan calls for execution. The associations of C Company, 5th Engineer Battalion, and the 140th Pioneer Company resulted in excellent interoperability training.

Command and control for interoperability training was a problem for two reasons. First, Company C mounted German APCs in order to keep up with the battle. Second, German communications doc-

Engineer equipment being moved through narrow German streets

trine prohibits any radio transmission until enemy contact is made. All panzer transmissions were sent by messenger. The first instructions received by C Company from the panzer brigade commander were "under no circumstances will you transmit on radios."

Radio communications for the entire exercise were a problem due to limited FM range, areas of radio dead space, shortages of secure voice equipment, shortages of allocated frequencies, and the requirement to operate more nets than organic radio assets allowed.

Movement was also a problem. Fifth Engineer units soon found that while moving through a German town on a narrow street, an oncoming Blue or Orange force could be coming toward them on the same street. Movement showed a lack of training in reading and understanding bridge classifications. At times, M60 tanks were seen crossing class 20 or smaller bridges. At the beginning of the exercise, B Co, 5th Engineers did considerable bridge recon and classification to support maneuver units.

By 3 February, Orange Forces had penetrated deep into the Blue Force zone and it was time to reorganize and conduct the Blue Force attack phase of "Certain Sentinel." However, a sudden thaw caused soft, muddy ground conditions which resulted in subsequent extensive maneuver damage to the German countryside. As a result, the decision was made to terminate the exercise, leaving the 5th Engineer Battalion with five additional days to plan for training.

The commander of the 7th Engineer Brigade, who was on top of every aspect of engineer support throughout the exercise, anticipated the problem and had all player units prepare a training schedule to productively utilize the unscheduled time previously planned for the Blue offensive phase.

THE FIGHTING FIFTH seized the opportunity to train all units on German prechambered targets and to conduct Medium Girder Bridge training. Both the "Fighting Fifth" and the 38th MGB Company were determined to do some unique MGB bridge training. The decision was made to construct a class 60 double story MGB and airlift it into position. It would be the first time that the MGB was emplaced by helicopter.

The 5th Engineer Battalion planned the exercise using the Illesheim training area. Coordination with VII Corps aviators produced three CH47 Chinook aircraft for the exercise (one for bridge lift, one for deck filler panels, and one for troop transport).

The next morning, the 38th MGB Company

Chinook being hooked to MGB deck filler panels

established two training sites at Illesheim. The 82d Engineer Battalion would train at the first site and the proposed airlift construction would take place at the second site. Because of an excess of 82d Engineer Battalion personnel, a decision was made to have A Company/5th Battalion and the 82nd jointly construct the double story MGB to be airlifted. The bridge was constructed, less deck filler panels, and the pathfinders were brought in to rig it.

The bridge weighed 19,500 pounds with the Chinook having a maximum lift capacity, with considerable fuel trade-off, of 20,000 pounds. The MGB was located three kilometers from the gap. The Chinook lowered into position and hooked onto the bridge. The MGB lifted slowly and was carried to its destination where troops slowly moved it into position. This exercise provided excellent training and proved the feasibility of airlifting a 60' MGB.

During this training period, the 5th Battalion regrouped, recovered deadlined equipment, performed extensive maintenance, and prepared for

Personnel of the 5th and 82nd Engineer Battalions construct MGB during training phase

the move to Aschaffenburg, where the 9th Engineer Battalion and the Aschaffenburg community would host the 5th Engineer Battalion cleanup operation. After the road march to "A-burg," the 5th spent five days cleaning, inventorying equipment, and packing Milvans for shipment home.

A very intensified customs inspection was made of all equipment loaded in the Milvans for shipment back to the States, with special attention to cleanliness of all equipment. The time at "A-burg" gave the Fighting Fifth its first opportunity to sleep and live in a garrison environment after 28 harsh days of winter bivouac conditions.

On 16 February, the battalion moved back to Miesau to turn-in POMCUS equipment. An agreement was made to turn in by company sets to avoid reconfiguring everything back into a battallion set. The plan worked exceptionally well, with each unit tasked to provide support for a major phase of the turn-in maintenance operation. The task was to clean, service, inventory, inspect, and repair all equipment and sets in four days. The Fighting Fifth met the challenge and accomplished it with tremendous success.

After turn-in was completed, 5th Engineer personnel were rewarded with four days of relaxation, which included tours to Paris, Luxemburg, Verdun, and Germany. On 26 February, the troops resumed final preparations for customs inspections and redeployment. Personnel received the most extensive customs inspections immaginable and departed for home on 27 and 28 February by commercial aircraft.

LESSONS LEARNED

Engineer battalions, as well as maneuver battalions, must have their equipment stocks upgraded. One-half of all dump trucks issued were M-51 gasoline engine trucks averaging 17 years of age. Although they were practically "new" from lack of use, parts for these obsolete models were not available.

None of the dump trucks were issued with canvas. Had it not been for canvas provided by the 7th Engineer Brigade, cold injuries would have been a serious problem. Several trucks did not have heaters which are essential for defrosting windshields. Tool kits, sets, and outfits must be properly inventoried by current SCs. Fuel tankers as well as fuel trucks must be topped off at issue. The majority of radios were inoperable due to missing components and vehicle installation kits.

No longer can the traditional engineer workline be employed between divisions and corps units in a Direct Support role. Engineers must work in bounds. For example, the division would put in the first belt of obstacles and the corps battalion would put in the second belt. Division engineers would then bound behind the corps unit and put in the third belt of obstacles in depth.

This concept requires the same mobility for corps engineers as division engineers. When the artillery calls for reinforcement, a like mobile unit moves up; the engineers must follow the same principle. Corps engineers must be track-mounted with like equipment. However, they also need dump trucks for class IV and V transport and accomplishment of standard engineering tasks.

Major Laux was the S-3 of the 5th Engineer Battalion during the Winter REFORGER 79.

Selling Engineer Capability

to the Maneuver Commander

by MAJ V. Paul Baerman

THE MANEUVER commander on today's battlefield has a vast quantity of combat power at his call. In addition to the correct employment of his direct and indirect fire weaponry, he can effectively increase his combat power with a variety of combat multipliers, such as smoke and electronic warfare.

One of the most useful combat multipliers is terrain reinforcement, done either by the maneuver unit alone or, most profitably, in conjunction with supporting engineers. However, its usefulness is directly proportional to the maneuver unit's ability to understand and apply terrain reinforcement measures. While it is incumbent on the maneuver commander to understand terrain reinforcement and its contribution to combat power, it is also the engineer's job to increase awareness of terrain reinforcement operations.

Terrain reinforcement (TR) operations are simply those measures that degrade enemy mobility and improve friendly survivability. To be effective, those operations require a fully developed coordination/partnership role between engineer and maneuver unit. Obviously, the maneuver commander must perform terrain analysis to have a good knowledge of the ground on which he will be operating.

THERE ARE a number of techniques which engineers can use to demonstrate the value of TR operations to maneuver commanders. This article examines those techniques from the viewpoint of a maneuver arms officer, with the goal of contributing to his awareness of TR operations.

Probably the most important step to keeping maneuver units in tune with TR operations is the establishment of a firm unit-to-unit relationship. Obstacles to the formation of such a relationship are many, but it is essential that these obstacles be overcome. The maneuver unit only appreciates other members of the combined arms team to the extent that those members are known and available. Ways to foster the unit relationship include the mutual exchange and review of training schedules, field training exercises, and classroom instruction.

If a maneuver brigade habitually receives the training schedules of each company of the engineer battalion, then the company commanders within the engineer battalion should also have access to the brigade's training schedules. Each engineer company commander's platoons should also receive the training schedules of the battalion which it habitually supports. The engineer platoon leader should review the schedule to determine if he can offer assistance with that battalion's training. After a period of time, the battalion should be aware that an engineer is part of the team, willing to assist.

Likewise, the engineer would be smart to send his company training schedule to the Brigade S-3 if there is training being conducted in which units of brigade could participate. To promote the unit-to-unit relationship, the engineer has to "sell" himself and his product. Regular, personal visits by engineer platoon leaders and company commanders also go far in promoting their "product" and improving training schedule interaction.

MANEUVER UNIT exercises should include engineer support or expertise. Of course, the Field Training Exercise (FTX) is the most obvious example, but there are numerous other opportunities for engineer support or expertise—Command Post Exercises (CPXs), war games/simulations, sand table, training exercises without troops (TEWTS), terrain walks, etc. TEWTS and terrain walks offer particularly good opportunities for the engineer to assist and foster knowledge of engineer capabilities.

TEWTS are generally low-key exercises that offer ample time for interchange of ideas, impromptu classes, and understanding of each other's jobs. At some time during these activities, the engineer should be explicit in pointing out where he *cannot* help and where the maneuver commander must help himself. Engineer expertise does not necessarily mean officer presence.

In many cases, lower ranking, knowledgeable engineers might prove more worthwhile, e.g., a D-7 operator talking to a maneuver platoon leader. In particular, the engineer should stress those items which he considers in an engineer reconnaissance.

Claymore mine being set on live-fire range at Fort Carson

Destroying a mine in place with C-4

OFFICER AND NCO classes also present opportunities to promote unit relationships. Again, it is a matter of the engineer forcefully "selling" himself and his product. There is enough change in engineer doctrine, when coupled with maneuver doctrine changes, to accommodate numerous engineer presentations to unit officers and NCOs in a classroom environment.

An additional opportunity for promoting unit relationships occurs when the brigade engineer and his subordinates participate in unit social functions.

But there is probably no better place to establish the capabilities of TR than during training. Here, the engineer can offer his expertise to train individuals or he can offer training tips to the maneuver unit commander.

Many basic TR tasks are included in maneuver unit Soldiers Manuals and Skills Qualification Tests. A unit can save valuable time by "packaging" hands-on training in kit form. One kit might come in a footlocker-size container and deal exclusively with the unit's authorized mines. The kit would include all the mock-up mines (from TASC), any graphic training aids (to be handed out to the troops), plus laminated cards on which instructions for emplacement and retrieval of each type of mine are included.

Kits can be used at small unit level during slack time (e.g., in the motor pool), for regular training periods, as concurrent training, or for inclusion in inclement weather schedules. Because kits are pre-packaged, they can be used quickly and with little advance preparation. Other similarly designed kits could cover such subjects as troop-emplaced obstacles (fougasse, etc.), demolitions, and booby traps.

RANGE TRAINING should be conducted with an eye to maximizing the potential of the range. By coordinating with the appropriate range authorities, units can conduct interesting, realistic TR training while on another type range.

How many times have you seen troops bored to death with concurrent training, such as weapons assembly/disassembly, while waiting to fire or awaiting transportation? Spice up their life a bit—let them fire a claymore,

or prepare and set off a demolitions charge, or build a flame mine. Its guaranteed to keep their interest and avoid training doldrums. The engineer can provide the expertise to start this training and, at the same time, to get across the importance of TR operations.

There are a number of easy ways, while in the field, to increase the maneuver commander's awareness of the use of obstacles and the effectiveness of terrain reinforcement. Many of these ideas utilize soldier ingenuity and promote the kind of thinking that will help overcome the odds we might be faced with on the European battlefield.

Here are some examples:

- Since mines are difficult to portray in the field (unless you use TASC mock-ups which must be accounted for and cost money), take scrap 2x4 lumber and cut it into 6-inch lengths. Paint the resulting blocks blue and stencil the word "MINE" on top and bottom. Several hundred of these can be made up and issued for field training. If some are lost, it doesn't really matter.

Scattered throughout an avenue of approach, these dummy mines force an attacker to perform some sort of mine-clearing action. To make the situation more interesting, bury a tear gas grenade (with pin pulled) in the ground and put a block on top of the grenade spoon. Anyone who comes along and kicks or lifts the dummy mine will set off the tear gas. It is called mine awareness and causes the attacker to slow down and be more careful when he encounters "blocks" the next time.

- CS/smoke grenades with pins pulled and buried in a road obstacle will definitely slow the CEV/tank dozer crew that pushes down the obstacle and sets off the grenades. They will also be more careful at the next obstacle.

- CS powder and/or pellets can be used to increase the value of less substantial obstacles by creating confussion or more difficult working conditions. How do you disseminate the CS? Tie or tape a baggie, with CS powder or pellets inside, to every smoke grenade or smoke pot. No matter what color smoke, one whiff of the burning CS and masking procedures will slow everybody and make them more wary.

- TR operations also include survivability of the friendly force. Survivability not only includes digging in personnel and equipment, but deceptive measures to increase the lifespan or usefulness of fortifications. The TOW and Dragon are crucial antitank weapons that must be protected. If you've had that maneuver unit out with their claymores, suggest splicing several strands of used claymore wire together and wire a TOW M-80 blast simulator to the ends of the claymore wire, setting the entire device off with the claymore "clacker." Voila! They've duplicated the signature of the antitank missile firing without giving away their position.

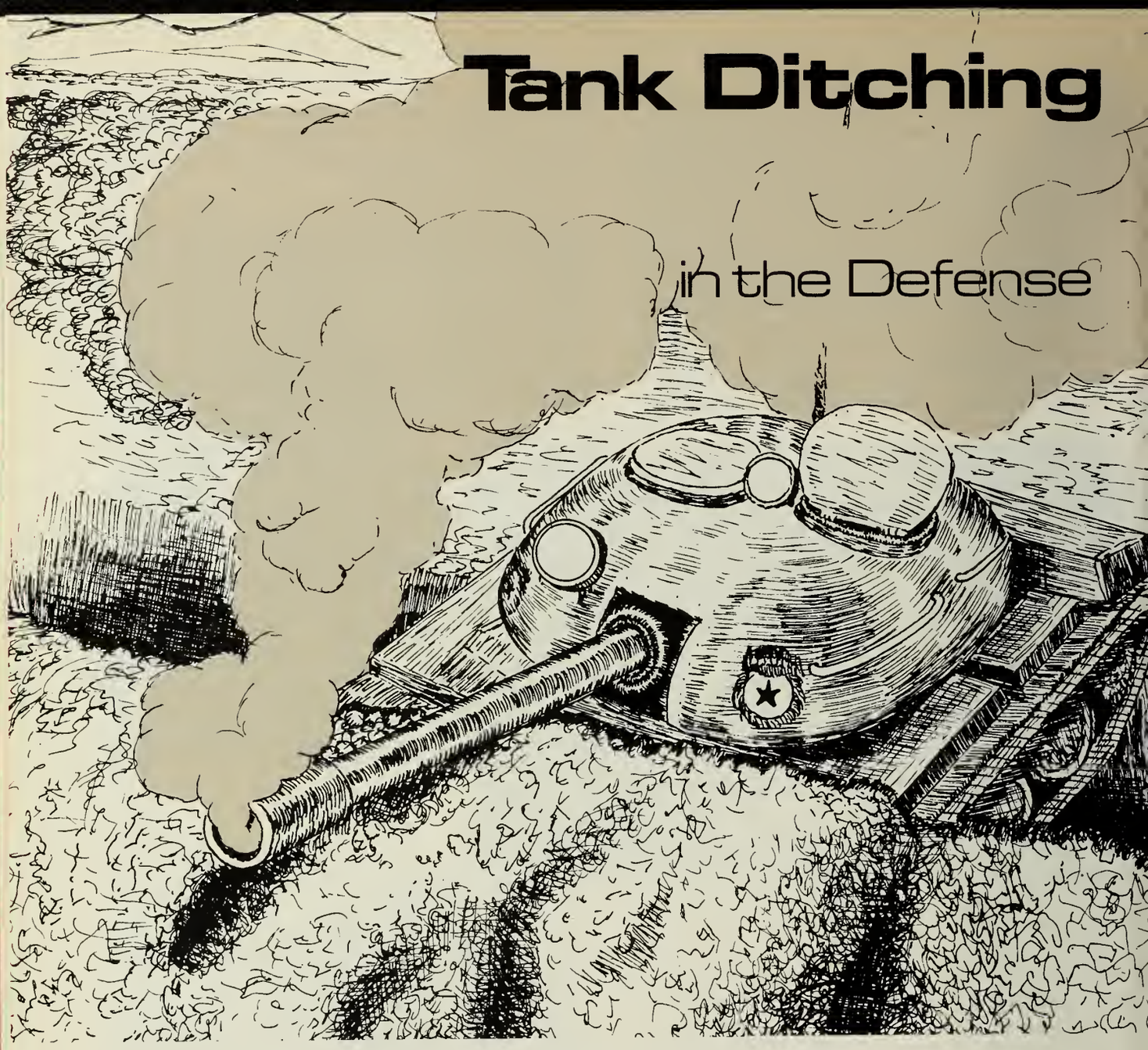
Bangalore torpedo set to fire

Such actions will increase the value of obstacles and, more importantly, increase the maneuver unit's interest in TR planning. "Tricks of the trade" of this sort allowed an armored cavalry platoon scout section, ably supported by engineers, to bottle up a mechanized infantry battalion for more than four hours in one recent exercise. And the scouts and engineers thoroughly enjoyed themselves!

These are just a few of the methods by which engineers can better sell their product to maneuver commanders and make the combined arms team more effective. The more aware that the maneuver commander is of his engineer assets and their capabilities, the better off he and his engineer partner and their soldiers will be.

Major Baerman is an Armor officer who wrote this article while attending the Command and General Staff College. Previous assignments have included command of a tank company and armored cavalry troop, and assignments as a battalion, brigade, and squadron S-3.

Tank Ditching in the Defense



by LTC Jerry A. Hubbard and MAJ John R. Mullans

PROPER terrain reinforcement is critical in our preparations to fight and win a no-notice defensive battle against forces vastly superior in numbers of personnel, tanks, and artillery. Terrain reinforcement is not the exclusive domain of the engineer soldier, but a result of the combined efforts of all forces on the battlefield. At every level tactical commanders must consider and implement those terrain reinforcing actions which will best support his overall tactical plans.

The 1973 Arab-Israeli War saw the re-emergence of an ancient terrain reinforcement concept in defensive operations—the barrier ditch. Using antitank ditches supported by minefields, the Israeli Defense Force in the Golan Heights defeated an attacking Syrian force which enjoyed an overall 4 to 1 superiority in tanks and a 10 to 1 advantage in artillery. The Syrians were required to use armored dozers and armored vehicle launched bridges for breaching, thereby preventing a rapid advance and channeling them into predetermined kill zones.

On today's battlefield, characterized by speed and mobility of forces and lethality of weapons systems, the antitank ditch is a valuable terrain reinforcer. The introduction of the antitank guided missile (ATGM) has greatly increased the ability of infantry to destroy tanks and is extremely valuable in overcoming the NATO disadvantage in numbers of armored vehicles. The antitank ditch stops a tank for two to five minutes, exposes lightly armored portions of the vehicle, and places its weapons systems in an ineffective attitude. It sets him up for the kill.

In 1976, the 94th Engineer Combat Battalion (Heavy) conducted a series of tests to examine the effectiveness of the antitank ditch as a barrier to armored vehicle movement, and to determine the capabilities of engineer

equipment to construct tank ditches. These results were discussed in the article, *"Anti-tank Ditches"*, by LTC Frederick A. Perrenot in the January - March 1977 issue of THE ENGINEER and are summarized in Figures 1 and 2.

THESE TESTS developed equipment combinations which could operate effectively as a tank ditch team. They also determined the maintenance support required to keep the team operating. The term *Tank Ditch Team* (TDT) represents the optimum mix of equipment which, operating independently as a unit, can efficiently construct tank ditches. Optimum teams consist of two dozers, a dozer and front end loader, and three each 290 rubber-tired tractors with scrapers, with either an additional tractor or dozer as a pusher.

The 94th Engineer Combat Battalion (Heavy), after reviewing missions, capabilities, and equipment assets, developed a self supporting element capable of tank ditching. This element, referred to as the Tank Ditch Element (TDE), underwent several changes in composition and capability after strictly in-house engineer review. However, the battalion had never before had the opportunity to review the concepts in a combined arms exercise. FTX Certain Shield (Reforger 78) proved to be the ideal opportunity to check and revise the original organizational concepts.

The 94th is organized with a Headquarters and Headquarters Company, an Engineer Equipment Maintenance Company (Company A), and three Combat Engineer Companies (Companies B, C, and D). For FTX Certain Shield, the battalion deployed in General Support of V Corps with two companies providing engineer support on an area basis to the rear of the brigade rear boundary, one company providing the command and control element, and the majority of personnel and

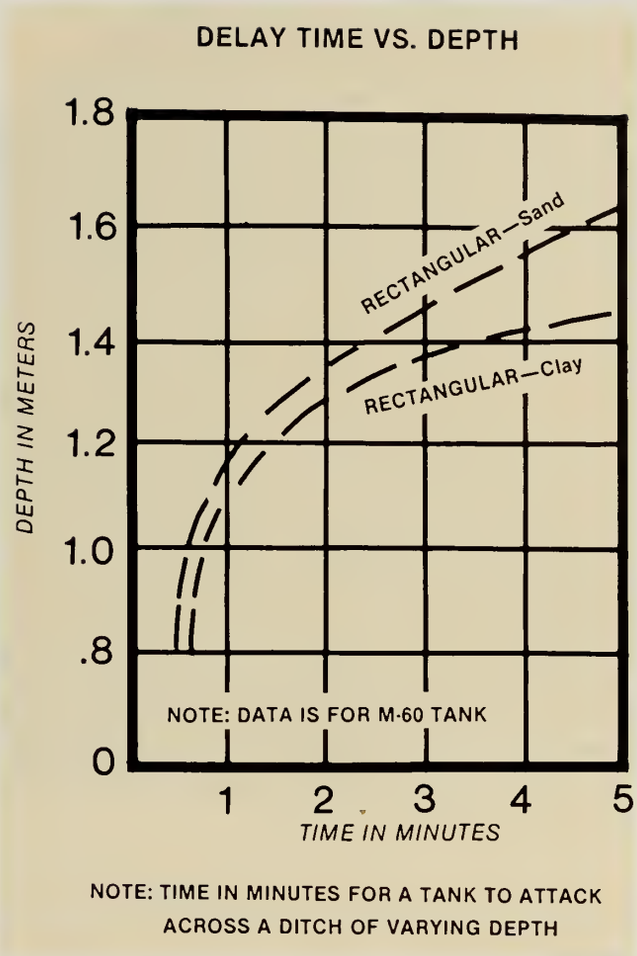


FIGURE 1

TANK DITCH CAPABILITY OF ENGINEER COMBAT BATTALION (HEAVY)

NUMBER OF TEAMS BY TYPE*	SAND		CLAY	
	HOURLY RATE Each team (meters/hour)	DAILY RATE** All teams (Km/day)	HOURLY RATE Each team (meters/hour)	DAILY RATE** All teams (Km/day)
3 SCRAPER TEAMS (each team includes three tractors with scrapers and one tractor without scraper)	100/hour	0.1 x 3 x 20 = 6 Km/day	125 m/hr	.125 x 3 x 20 = 7.5 Km/day
5 DOZER TEAMS (each team includes two dozers)	100/hour	0.1 x 5 x 20 = 10 Km/day	80 m/hr	0.08 x 5 x 20 = 8.0 Km/day
INCREASE IF SCOOP LOADERS TEAMED WITH DOZERS*** (three additional teams)	(100)	0.1 x 3 x 20 = (6)	(80)	0.08 x 3 x 20 = (4.8)
TOTAL BATTALION CAPABILITY	200 meters/hour (300)	16.0 Km/day (22.0)	205 m/hr (285)	15.5 Km/day (20.3)

*Expected availability rates: 290 Tractor—67%; Dozers—80%; Scoop Loaders—50%

**20-Hour Combat Day, 4 hours maintenance

***This equipment might better be used in digging defensive positions

NOTE. Rates will vary according to weather and soil conditions

FIGURE 2

Cross-section of finished anti-tank ditch

equipment for the Tank Ditch Element (TDE). The organization of the TDE as it deployed is shown at Figure 3.

The 94th was the only General Support engineer battalion available to V Corps during FTX Certain Shield. In order to best use its capabilities, the Corps Engineer used the 94th only in support of defensive operations. Therefore, during the first half of the exercise, the battalion supported the Blue Force while it was on the defensive and then was inserted in support of the Orange forces as they reverted from the offense to defense.

ON THE BLUE side, the TDE was placed in direct support of A Company, 7th Engineer Battalion, supporting the 1st Brigade, 5th Infantry Division (Mechanized). The brigade commander, with his engineer advisors, developed a terrain reinforcing plan to support his overall tactical plan for defense in the main battle area. The covering force battle enabled the terrain reinforcement, approximately 20 kilometers to the rear of the initial line of contact, to proceed without enemy disruption. The battalion was credited by the umpires with completion of 15 ditches totaling over 14 kilometers in length.

At this point, it is necessary to explain the realities of operations on such a large scale as FTX Certain Shield. Maneuver damage and environmental protection considerations precluded the actual digging of antitank ditches. Umpires credited the Tank Ditch Teams with completion of 80 meters of tank ditch per hour once they arrived and sited their equipment at the ditch location.

All five Tank Ditch Teams worked in the 1st Brigade area. The Tank Ditch Element was responsible for providing administrative and logistical support to the teams. The teams themselves, each under the leadership of an E-5 or E-6 NCO, received their movement and digging instructions directly from the 7th Engineer Battalion Platoon Leader coordinating the work in that sector. Teams were spread across a front of about 15 kilometers and were constantly being moved to new locations. The primary concern of the headquarters and operations sections of the TDE were locating teams and providing them with mess, maintenance, fuel, and administrative support. The difficulties encountered in providing hot meals for the exercise could not be completely overcome and C-rations often had to be substituted.

Since the equipment was not actually digging and no maintenance or battle damage play was inserted by the umpires, the utilization of maintenance and repair parts

personnel and supply channels was not exercised.

The value of tank ditches was summarized by Colonel Stephen R. Pawlik, Commander of the 1st Brigade, 5th Infantry Division (Mechanized): "tank ditches, as part of the obstacle and denial plan, proved to be an important and significant reason that the opposing forces could not penetrate the brigade defense."

DURING the middle weekend of the FTX, as the roles of the opposing forces were reversed, the battalion was withdrawn as the Corps General Support Battalion working directly for the 130th Engineer's Blue control element and was placed in Direct Support of the 23rd Engineer Battalion, divisional engineer battalion of the 3rd Armored Division. The TDE, augmented by one additional dozer team, was then attached to the 23rd with the teams further attached to the division engineer companies supporting brigades across the 60 kilometer front (Fig. 3). This wide separation made their attachment to the supported companies mandatory. However, only the maintenance section of the TDE had the necessary repair parts and trained mechanics to perform maintenance on the heavy engineer equipment.

The weather, which had been relatively good the first week, turned rainy with reduced visibility as the Orange defense began. Safety became a paramount concern in moving teams of oversized equipment on the small crowded German secondary roads.

Where Blue force had fought a covering force battle to provide time to prepare the defense of the main battle area, the Orange force defended against the counterattack in their most forward positions. The tank ditch teams were directed to dig their ditches in or near the line of contact. Because of the rapid advance of the Blue forces and the low mobility level of the TDTs, they were repeatedly overrun. On one occasion, a team on its way to a proposed ditch location in the forward area was captured by Blue forces. The completion of only five ditches totaling four kilometers was the result of the attempt to dig far forward in the battle area.

Several major problem areas in the control and administration of the TDE surfaced during the exercise. Some have been addressed by the battalion, while others involve fundamental problems which must be addressed in the larger context of basic missions and equipment of the combat heavy battalion.

The lack of communications was the major problem encountered. The problem resulted first due to the lack of a central point of contact at the tactical brigade level, and second, due to the lack of radios and the resulting inability to communicate with TDTs on the rapidly changing battlefield. The combat heavy battalion does not have the organic communications equipment to support decentralized, modular employment of its assets.

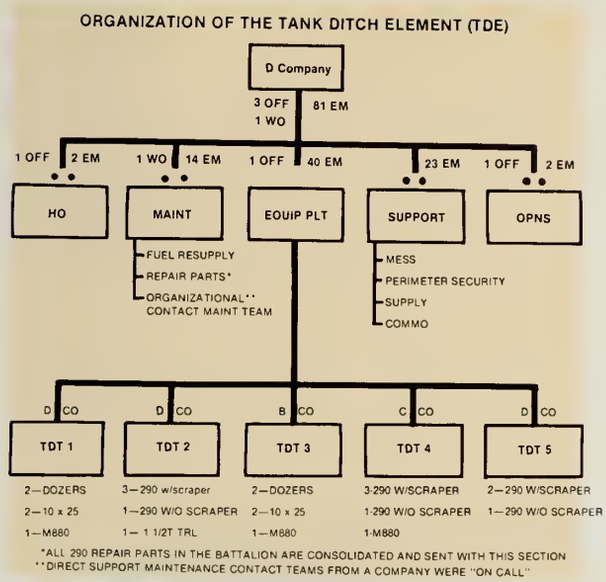


FIGURE 3

The slow-moving, very vulnerable heavy equipment of the combat heavy battalion is not suited to front line employment. The TDE must have 24 to 48 hours lead time to produce a usable obstacle for the tactical commander.

THE CONCEPT of forming a special organization to control and support tank ditching assumes the team will be used in a limited geographical area. Because of unique equipment and the requirement for maintenance and repair parts, it is essential that the TDE be provided this support in a timely manner. In retrospect, the employment of teams across the entire Orange division front was unmanageable. Better support could have been provided by each parent company controlling its own element from its position in area support to the rear of the brigade rear boundary.

In a wartime situation, support requirements change. Since C-rations would be the norm, the need for a mess section is obviated. By co-locating the headquarters and maintenance elements with the brigade trains of the supported brigade, the requirement for a perimeter security force is deleted. The maintenance requirements increase with the need for direct support maintenance teams and a corresponding array of repair parts.

With proper employment, the tank ditch capability of the Combat Heavy Battalion can provide the decisive edge required for victory on the modern battlefield. It produces a creditable obstacle without the logistics and transport requirements of, for example, a minefield. It reinforces the terrain to allow full utilization of both direct and indirect fires and provides the tactical commander an important multiplier of his combat power.

Lieutenant Colonel Jerry A. Hubbard was Commander of the 94th Engineer Battalion (Heavy), while Major Mullans was the S2/S3 of the 94th during FTX Certain Shield, REFORGER 78.

SOVIET

engineer equipment

by MAJ Arthur J. Parr, Jr.

SURELY there is no interested military engineer who has not heard of the "ribbon bridge," the Soviet PMP of which the U.S. ribbon bridge is an improved version. This item of equipment, and most other Soviet bridge construction and assault crossing equipment items are at least recognizable to non-Soviet combat engineers due to their size, visual impact, or uniquely Soviet design and purpose. But what about the less visibly-striking mine and countermine warfare equipment, the field fortification equipment, and road construction equipment?

While it is easy to stress Soviet equipment for river and gap crossings, the frequent result of doing so is that other Soviet engineer items receive bare mention. A comprehensive review of this equipment, besides re-creating the existing equipment identification manuals, would simply require too much space.

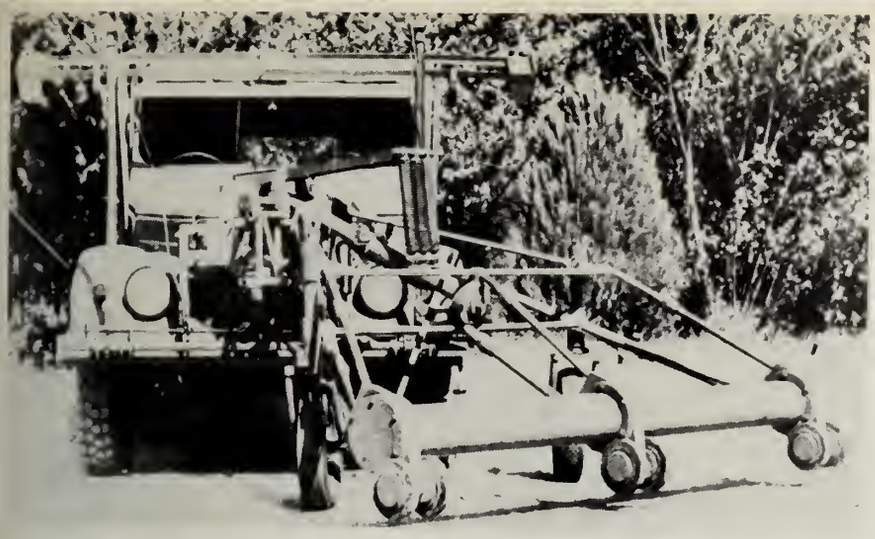
This article deals with standard equipment items in Soviet tank and motorized rifle divisions, stressing certain types which are generally not included in presentations on the Soviet military. Prior generations of equipment continue in use in reduced-readiness category divisions and non-divisional combat engineer units, so older items which retain their importance are included here.

Soviet equipment designations used here can convey meaning to the language-trained analyst to aid in his understanding of the role and function of a given equipment item. Much as UET or CEV both designate and, to a degree, describe those items of equipment, so also IMR (inzhenernaia mashina razgrazhdeniia) designates and describes the Soviet "engineer obstacle-clearing vehicle." Unfortunately, not all Soviet designations expand as usefully, nor are all the expansions known.

THE BASIC manual reconnaissance and mine clearing kit KR comprises one sectional mine probe, one four-prong grapple with approximately 50 meters of rope, one lot of small marking flags, one reel of black/white marking tape, and a pair of wirecutters. Hand-held portable mine detectors include the World War II-period VIM series, the post-war UMIV/UMIN type, and the transistorized IMP.

All are capable of detecting metallic mines or mines with metallic components on dry land, at detection depths ranging from 35 to 50 centimeters, and (except in the case of the UMIV) in water to depths of slightly more than one meter. For high-speed detection of metal-body antitank mines to depths of 25 centimeters, the road induction mine detector DIM/DIM-3 is used. This detector is mounted on a GAZ-69 or UAZ-469 jeep and can sweep a 2.2 meter wide strip at speeds up to 10 kilometers per hour on roads and at lesser speeds cross-country.

Mechanical mine clearing equipment designed to be mounted on tanks includes mine rollers, plows, and combination plow-roller sets. The older cross-country mine



Road induction mine detector (DIM)

sweepers PT-54 and PT-55 have now been largely supplanted by the route mine clearers KMT-4 plow and KMT-5 roller-plow combination. Each KMT-5 requires a 7.5-ton cargo truck fitted with a special auxiliary crane (KM-61) for normal non-operational transport. Each roller of the KMT-5 sweeps approximately 80 centimeters, while each section of the KMT-4 plows a strip approximately 60 centimeters wide.

EXPLOSIVE mine clearance means include rocket propelled line charges and the bangalore-torpedo type elongated charge UZ, which may be conformed as single, paired, or triple (triangular) charges. Minefields can also be cleared by using the charge-emplacing devices SPZ-2, SPZ-4 and ITB-2. The SPZ-2 is a metal-framed guide which uses a winch to draw the charge onto the minefield from the near edge. The ITB-2 propels a rocket-launched cable and anchor across the minefield, then uses a winch or other motive force to draw the charge toward the anchor and onto the field. The SPZ-4 appears to be the most widely-used device discussed in the military journals. It is a fitting which permits a tank to push or pull the prepared charge into position on the minefield. Rocket-propelled line charges mounted on specially-equipped tanks or armored personnel carriers are not discussed in Soviet journals and their characteristics are uncertain. The demolitions kit used with the explosive means above may be designated "SMP".

In response to their doctrinal requirement for high-speed emplacement of antitank minefields, the Soviets have developed and deployed a number of towed and tracked self-propelled minelayers. Detachable mine chutes and the obsolescent PMR-2 trailer may be used by any APC or cargo truck for surface emplacement of antitank mines. With the PMR-3 or PMZ-4 trailers, a four or five-man crew can emplace up to 200 antitank mines, depending on the carrying capacity of the towing vehicle, on the surface or buried 30-40 centimeters in the ground, in less than 20 minutes. The GMZ tracked minelayer vehicle with a four-man crew can surfacelay or bury antitank mines (transport capacity variously estimated at 150-200 mines).

Mine detection team emplacing marker flags

RECENT articles in the Soviet press (1976) have also discussed locally-developed, non-standard, mechanical devices for assisting in the emplacement of antipersonnel mines, and the use of floating or bottom-emplaced anti-assault mines for riverline or shoreline mining.

Minelaying devices also may be fitted to helicopters. A special Victory Day film aired on Moscow television in May 1978 showed the MI-8 (HIP) helicopter fitted with a new type of minelayer chute, a horizontal "foot" at the end of the chute to cause antitank mines to fall to the ground with the desired "fuse up" attitude, at a 2-3 meter interval.

Equipment contained in the pioneer kit includes the following: sapper shovel, entrenching tool, pick-mattock, carpenter's axe, crow bar or digging bar, 2-man cross-cut saw, and a tracing cord or tape. Mechanical entrenchers and excavators include: the BTM-3 high-speed entrenching machine which can dig 200-300 meters per hour of 1.5-meter deep trench (maximum capacity: 1120 meters per hour of .8-meter deep trench); the PZM regimental digging machine which trenches to 1.1 meters deep and excavates weapon or vehicle pits to three meters deep at a rate of 100 cubic meters per hour; the MDK-2 rotary excavator which excavates 3.5 meter-wide pits or trenches, to 3.5 meters deep at a rate of 200-300 cubic meters per hour; and the E-305V single-bucket excavator which can trench or excavate to 4.1 meters deep at a rate of 50-60 cubic meters per hour.

BTM high-speed entrenching machine

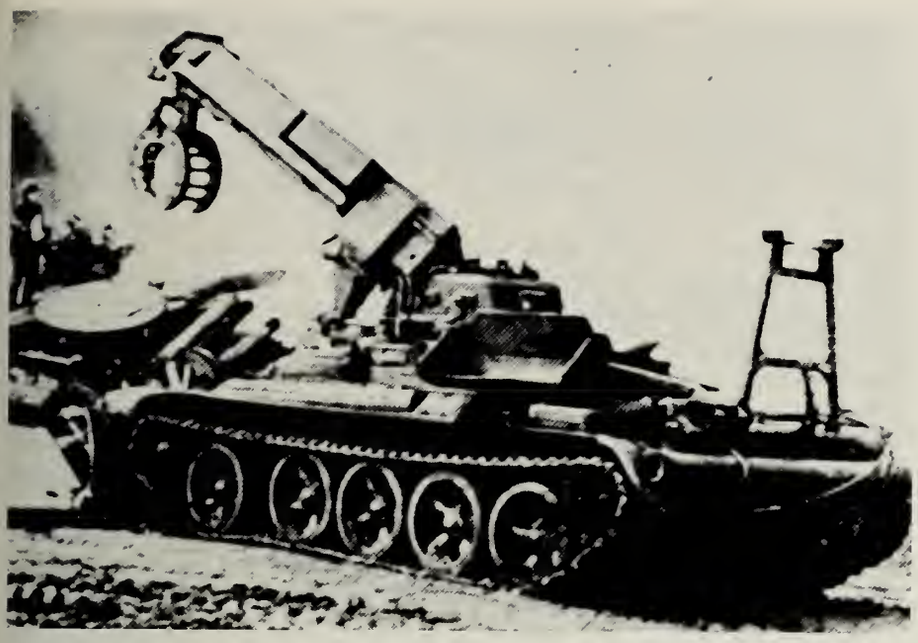
A WIDE range of prefabricated field fortification components are available, including corrugated steel and concrete shelter cover, and reinforced straight or curvilinear cardboard sandbags. Fortification is completed by the use of MKT-L, -T or -S camouflage sets (twelve 6x3 meter net panels per set), metallic radio-location reflectors OMU, and various mockups and dummy equipment.

Route construction equipment includes: the BAT or BAT-M road constructor, based on a heavy tracked artillery tractor, which mounts a variable-configuration dozer blade and a 2-ton crane in the BAT-M version, with a working capacity (depending on the task) of 120-400 cubic meters per hour, or four to eight kilometers per hour of cross-country route; the PKT, based on the MAZ-538 wheeled tractor, which can prepare graded and crowned cross-country routes at a rate of two to three kilometers per hour, or vehicle pits at a rate of 800-1000 cubic meters per hour; and various types of dump trucks and graders which may be available, although engineer road work in divisional units would appear to de-emphasize hauling and grading.

Some additional fortification and route construction support may be gained from the use of strap-on dozer blades for tanks and artillery tractor prime movers. The BTU/BUT-55 (bul'dozer tankovyi universal'nyi—miltipurpose bulldozer tank) has a working capacity of 100-200 cubic meters per hour. Its winter counterpart is the STU or STU-2M (*snegochistitel'* tankovyi universal'ni—universal tank snowplow). OL-T, OS-T, and OT-T dozer blades may be fitted to the AT-L light artillery tractor and AT-S medium artillery tractor and the AT-T heavy artillery tractor, respectively. Where prepared roads or cross-country routes become impassable due to weather or heavy usage, use will be made of fascines, corduroy roads, spaced-log roads for tracked vehicles, and prefabricated sectional wooden treadway blocks or hinged sectional steel treadway mats, where available. Prefabricated steel roadway sections are known to be available with rear Road Construction Troops at higher echelons. There, use or availability in engineer units at or below division level is probably quite limited, due to simple logistical considerations.

THE MOST recent addition to the available types of road construction and obstacle clearing equipment for tactical units is the IMR engineer obstacle-clearing vehicle. This vehicle has a 2-man crew, a mechanic-driver and an operator. It is fitted with an extendable hydraulic "Manipulator" and a dozer blade. It is used under fire for clearing abatis or removing steel or concrete beams from collapsed buildings, as well as to assist in tank-dozer tasks such as clearing contaminated soil, preparing firebreaks, and light road repair.

For wet or dry short gaps beyond the capabilities of



IRM engineer obstacle-clearing machine

simple expedients, vehicle-mounted bridges are used. The obsolescent KMM truck-mounted treadway bridge comes in sets of five 7-meter spans with 3.5 meter long adjustable trestles (on 4 spans), and may be fully constructed in 30 minutes by a well trained crew. Its carrying capacity is 12 tons, its maximum width of span per set is 34 meters, and it requires a crew of 10 men. The KMM has been largely replaced in Soviet forces by the TMM heavy truck-mounted bridge, which is issued in sets of four 60-ton capacity spans, each 10.2 meters long with 3-meter adjustable trestles. The full 40-meter bridge requires a crew of 12 and takes 15-30 minutes to emplace. Both KMM and TMM may be emplaced underwater, with emplacement times increased by one-half. Since both KMM and TMM are truck-mounted, MTU tank-launched bridges are selected for use under enemy fire. Both the MTU (T-54 tank, 50-ton capacity) and MTU-20 (T-55, 60-ton) use a cantilever-launch method for spanning up to 11 and 18 meters, respectively. Scissors-launched bridges developed by the East Germans may also be used by some Soviet units.

IN SITUATIONS where it is desirable to keep open a crossing site after vehicle-launched or ponton bridges have been removed to other sites or displaced forward, prefabricated bridge elements may be employed. One such wood and metal bridge uses telescopic trestle bents with 6-beam wooden treadways. Each span is four meters long with a 35-ton capacity. Larger capacity (60 ton) spans of the prefabricated wooden low-water bridge USM may be constructed on existing or specially-driven piers.

The bridge construction equipment set KMS, used to drive wooden pylons for bridge piers, consists of four pile-drivers mounted on float bridge sections, with auxiliary folding assault boat sections, all transported on five trucks. The 28-man crew, augmented by reconnaissance elements and bridge element transport trucks, is organized into the following functional teams: pile-driver operating team, pier-building team, free span emplacement team, pile bent delivery team, treadway assembly team, and truck drivers to pick up assembled treadways for delivery to the bridge site.

Average construction speed on pile piers is 15-20 meters per hour, and 20-25 meters per hour on trestle piers. Bridge elements may be prepared from locally available materials using pioneer kit saws, chain saws, and the trailer-mounted LRV high-capacity gangsaw or RP-75 lumber sawframe.

Float bridge support for airborne units is provided by the air-droppable, helicopter transportable PVD-20 airborne forces bridge set which consists of aluminum balks on rubberized fabric floats, comprising ten 4-ton ferries or rafts of up to eight tons capacity, or 8-ton bridges up to 64 meters long. The bridge is normally transported on 10 GAZ-63 2-ton trucks or six ZIL-151/157 4.5-ton trucks.

Float bridging for motorized rifle and tank units is provided by the TPP heavy ponton bridge set or PMP ponton bridge set. The TPP consists of bow and center-section rigid metal pontons with an integral roadway assembly superstructure, transported on ZIL-151/157 trucks. A full set includes 48 bow sections, 48 center sections, 12 power boats, and auxiliary equipment. The set may be configured as varying capacity rafts, or as bridges, with up to 70-ton capacity.

TPP HAS been almost entirely superceded by the PMP ribbon bridge. The full 36-link PMP set (32 river links and four shore links) may be configured as 40 to 170-ton

rafts, or 20-ton or 60-ton bridges using 12 powerboats for emplacement and stabilization of the bridge. Divisions normally have a half-set (one complete bridge) of 16 river and two shore links, six boats, and auxiliary equipment. This gives the division the capability to construct 118 meters of 60-ton bridge, 225 meters of 20-ton bridge, or rafts.

To facilitate raft construction, each river link has auxiliary ramp sections. Transition from rafts to bridging, and vice versa, is rapidly accomplished. Norms for bridge construction in current velocities up to two meters per second require rates of nearly eight meters per minute, and substantially faster have been observed.

Powerboats of the BMK series are used with both the TPP and PMP. Most of the boats are towed, having integral wheel struts instead of trailers for transport. The most recent model, the BMK-T, is transported on a modified ponton carrier truck, launched and recovered in the same manner as the PMP pontons.

Line of communication bridges such as the heavy ponton PPS, highway railroad ponton bridge NZhM-56, and fixed or sectional bridges such as the RMM, MARM, and SARM are not organic to division combat engineers, but are deployed with Road Construction Troops of the Military Transportation Service. The Soviet military newspaper Krasnaia Zvezda (Red Star) recently disclosed the existence of an underwater ponton bridge, which appears to have a carrying capacity of less than 20 tons. Allocation of the bridge is not known.

RECENT developments in Soviet amphibious equipment have extended beyond light amphibious tanks and APCs to include the new self-propelled 122mm artillery, and the SA-8 Gecko and SA-9 Gaskin air defense missile systems. These developments, and the wide use of snorkelling tanks, are geared toward reducing the combat requirement for assault engineer support. Soviet engineers, however, still possess a wide range of assault river crossing capabilities, from simple pneumatic or collapsible canvas-and-frame assault boats and individual flotation kits, to amphibious transports and ferries.

The obsolescent MAV is an amphibious jeep-type vehicle, primarily used for command or reconnaissance, with a five-man or 500 kilogram payload. The ZIL-484 BAV, an improved version of the U.S. World War II DUKW, is a wheeled amphibian capable of handling loads up to 3.5 tons (28 men, a light gun or howitzer, or an unloaded 2-ton truck) at speeds of 8-9 kilometers per hour for up to six hours. It is safe to say the BAV has been replaced in virtually all active Soviet combat engineer units by the K-61 tracked amphibious transporter, which is, in turn, being replaced by the PTS/PTS-M tracked amphibious transporter.

The K-61 can transport 5-ton loads (50 men, a 100mm gun or 152mm howitzer, etc.) for up to eight hours at speeds of 8-9 kilometers per hour. The PTS can accommodate a 10-ton load (72 men, one or two guns, one prime mover) at speeds of 10-11 kilometers per hour for 10 hours of continuous operation. The PTS can transport an artillery prime mover, an artillery piece, and its crew in a single lift. The gun can be rapidly loaded or unloaded without disconnecting the PKP from the PTS, thus greatly speeding turn-around time in river crossing operations. The PTS also has a designed capability to function over the beach or as an ambulance vehicle, transporting 12 litters on special rack mounts.

THE GSP tracked, self-propelled ferry is designed for the transport of heavy tracked vehicle loads (to 50 tons). It consists of non-interchangeable left and right-half units with large, foam-filled outboard pontons that are carried on top of the basic vehicle and rotated outward once the vehicles are connected in the water. The crew is probably five men.

Engineer reconnaissance equipment includes scuba and light diving equipment; various devices for measuring current velocity, taking bottom soundings to determine river bottom composition and profile, etc; and optical equipment such as the engineer reconnaissance periscope PIR/PIR20, sapper range-finder DSP-30, the long focal length periscopic camera PDF, and other periscopic and binocular observation instruments.

Water purification and supply equipment, in addition to tanker trucks and cisterns, includes the truck-mounted filtration station and other mobile purification sets with capacities up to 1800 liters per hour.

Generators are employed for power supply to lighting sets, gangsaws, jackhammers, augers, and other purposes. Designations "ESB" or "ESD" indicate "electrical station" powered by gasoline or diesel fuel, respectively, followed by a numerical designation of the unit's power output in kilowatt hours and a two-letter indicator of the general application of the unit. Thus, for example, ESB-4-IB designates a four-kilowatt-hour, gas operated generator for engineer earth preparation.

Numerous crane trucks are available to engineer troops, but divisional units seem most frequently to be equipped with the K-61, K-67, 8T210, and auxiliary cranes such as the KM-61. Engineer repair service to engineer units on the move is provided by the APRIM-M, PARM-1, and TRM-A or TRM-B mobile repair shop vans.

Major Parr is currently assigned to the Office of the Joint Chiefs of Staff as a Presidential Translator on the Washington-Moscow hotline. He was previously assigned to the Defense Intelligence Agency as a Soviet Ground Forces Analyst. Major Parr has had two previous articles on Soviet military engineering published in **ENGINEER.**

Officer Career Info

COLONELS

The new Engineer Colonels assignment officer at MILPERCEN is Lieutenant Colonel Arthur Williams. He recently graduated from the Navy War College after a tour in Korea.

LIEUTENANT COLONELS

Lieutenant Colonel Ernest J. Harrell has taken over the Specialty 21 assignment desk at MILPERCEN. He recently completed a tour as battalion commander of the 43rd Engineer Battalion at Fort Benning, GA. He is a 1973 graduate of the Command and General Staff College.

MAJORS

Congratulations to those officers who were selected for promotion to Major (AUS) by the board which met in April.

COMPANY GRADE OFFICERS

This year, as part of the second specialty designation process, 124 officers from other branches will be designated SC 21, Engineer, as a second specialty. Many of these officers will be eligible for tours as Engineers in the near future. Most assignments for tours in the second specialty will be made to Engineer Districts and Facilities Engineer positions.

All company grade officers are urged to insure that results of physical examinations and official photographs are current and on file at MILPERCEN. Photos provide a first impression when board members review your file. Is yours more than four years old? Have you failed to have one taken since your last promotion? If your answer is "yes" to either question, you should submit an up-to-date photo as soon as possible.

WARRANT OFFICERS

Congratulations to those warrant officers who were selected for promotion to CW3 and CW4 (AUS) earlier this year. Announcement of selectees for promotion to CW2, 3, and 4 (RA) is expected in October.

OPMF CONVERSION

The destruction of OPMF paper files for all officers except Majors and Lieutenants had been completed as of 1 July. The start date for destruction of the remaining paper files is 1 September. Copies of the paper files for grades 0-1, 0-2, and 0-4 may be purchased through 31 August. As announced previously, all paper files are being converted to microfiche files. The MILPERCEN contact for Majors and Lieutenants who still wish to purchase a copy of their paper files is Lieutenant Colonel Heseman, Autovon 221-9612/3.

OER SUPPORT FORM

The Army will transition to the new Officer Evaluation Reporting System during the period 15 September to 1 November. The new system includes several features which haven't been part of previous OER systems.

One of the new features is DA Form 67-B-1, the OER Support Form, which is viewed as an ideal technique for increasing two-way communications between the rater and rated officer, especially in terms of developing and clarifying the elements of the rated officer's performance.

The Support Form is designed to be used by the rated officer and rating officials. It is not forwarded to DA. At the beginning of the rating period the form is used as a guide for discussion between the rater and rated officer about the rated officer's duties, responsibilities, and performance objectives for the period. During the rating period, it acts to guide the performance of the rated officer and the counseling and coaching by the rater. At the end of the rating period, it gives the rated officer an opportunity to provide the rating chain information about his performance from his point of view.

At the beginning of the rating period, the rated officer receives a copy of the Support Form which is blank except for the name, grade, and position of his rater and the positions of the remaining members of his rating chain. Within the first thirty days of the rating period, the rated officer and rater are required to discuss Part IIIa, the specific nature of the rated officer's duties (his duty description), and Part IIIb, the focus or direction of his performance (his major performance objectives).

It is important to note that although the objectives are meant to focus attention on only the more critical aspects of performance, they are not all inclusive. The rated officer is still responsible for all that is normally expected of his grade and duty position.

These objectives can be developed in several ways. They can be set by the rater, suggested by the rated officer, or jointly developed. Furthermore, task can be accomplished formally or informally, depending on the situation, style and personality of the rater. The important thing is that the discussion takes place and the rated officer gets started in the proper direction.

During the rating period, the rater and rated officer should update the duty description and performance objectives to reflect shifts in emphasis additional missions, and other changes that are likely to occur.

At the end of the rating period, the rated officer receives a Support Form with Parts I and II filled out, to include the names of the senior rater and the intermediate rater if one has been included in the rating chain. The rated officer is required to complete all three portions of Part III—his duty description, major performance objectives, and significant contributions—and submit the Support Form to his rating chain. if the rated officer has kept his information updated and has continued to communicate with his rater, he is in the best position to provide objective comments concerning his performance and avoid unrealistic remarks.

Part IV of the Support Form is for comments by the rater and/or the intermediate rater based on the entries made by the rated officer in Part III. These comments are optional. If comments are made they should address the accuracy of the duty description and performance objectives. Comments on performance should be reserved for the OER; however, if included in this part, they should be consistent with the performance and potential evaluation on the OER.

The completed Support Form accompanies the OER form through the rating chain and is returned to the rated officer after it is read and considered by the senior rating official. It does not accompany the OER to DA.

The Support Form instutionalizes a procedure that has been a part of effective military leadership for generations—that of clarifying performance expectations for subordinates and, in the process, assisting the subordinate in his professional development.

Enlisted Career Info

BRANCH CHIEF COMMENTS

How would you like to answer the telephone an average of 120 times a day? Your career advisors at MILPERCEN do, and they spend an average of three minutes talking to each engineer soldier who calls.

Some of the questions asked include: Where is my next duty assignment going to be? When can I expect to receive orders for my next assignment? What is the turnaround time for my grade and MOS? What can I do to improve my chances for promotion? Why wasn't I promoted on the last E7/E8 list?

These are only a few of the multitude of questions asked by soldiers in the field, and we feel that it is important for us to give you the most accurate answer possible in the brief time allowed for a telephone conversation.

The most important tool available to provide you with a reasonably researched answer is your Career Management Individual File (CMIF) maintained here at MILPERCEN.

Who makes the most important input to your CMIF? You do, through your Military Personnel Office (MILPO). Each and every time we answer your correspondence or telephone call, we request an updated Preference Statement (DA Form 2635) and DA Form 2-1. It is extremely difficult for your career advisors to give you any kind of answer when the most current forms in your CMIF are three to 10 years old.

Remember, your most important file— the Official Military Personnel File (OMPF)—is maintained at the Army Enlisted Records and Evaluation Center, Fort Benjamin Harrison, IN, and it must be updated regularly. Do not, under any circumstances, bypass the OMPF and provide documents only for your CMIF maintained at MILPERCEN.

The mailing address for forwarding documents for inclosure in your CMIF is: MILPERCEN, ATTN: DAPC- EPL-E, 2461 Eisenhower Ave., Alexandria, VA 22331.

EER RULES CHANGE

Enlisted Evaluation Report (EER) rules for all EM changed April 1. The changes are designed to make EERs more complete and less frequent, according to MILPERCEN officials.

EERs are now required at least yearly but not during amonth that is based on a soldier's grade. Instead, annual reports will be made one year from a soldier's last report month. Exceptions to this change will be allowed if a soldier should need a "change of rater" or "special" EER, or if an EER must be delayed because a rater has not managed a soldier for at least three months. When a soldier does receive a "change of rater" or "special" EER, the next annual report will not be due until one year after that EER.

Other changes include mandatory comments in all EERs. Currently, comments are only required if soldiers are rated below or above average. Recommendations for promotion must also be explained in a rater's comments, no matter which option a rate recommends. Career development recommendations for schooling and assignments must also be made in every EER.

Another change is that raters will have the option of using a "complete the record," or updated, EER for soldiers in grades E-6 through E-9. This report could be made when a soldier is being considered by a DA promotion or selection board. This option will allow raters to "update the official record" and call attention to new and special information.

The new rules are spelled out in changes to AR 600-200, DA Pam 623-1 and DA Pam 600-8.

MOS 12F RESURRECTED

MOS 12F, Combat Engineer Vehicle/Armored Vehicle Launched bridge Crewman, is being resurrected effective 1 September. The MOS, which was converted to MOS 11E in 1976, will include Engineer APC Operators as well as CEV/AVLB Crewmen.

Reclassification is mandatory for all 12B1U personnel and for all current Skill Level 1 incumbents (19E10 and 19F10) now serving in CEV/AVLB positions. Reclassification is voluntary for Skill Levle 2 and higher personnel currently or formerly associatd with CEV and AVLB.

Coordinating drafts of Soldiers and Commanders Manuals for MOS 12F were scheduled for completion in August and should be delivered to TRADOC in January 1980 for printing and world-wide distribution. Manuals should arrive at unit level by next summer.

Work on Skill Qualification Tests for skill levels one through four will begin at The Engineer Schol late this year. The initial testing period will have an evaluation (ending) date of 30 June 1982.

Soldiers in grades E-6 and E-7 who qualify for relcassification into MOS 12F may apply for Instructor duty in the 12F Course, which is to be taught at Fort Leonard Wood, MO. Applications should be forwarded through command channels to MILPERCEN.

MILPERCEN CONTACTS

Should you at any time wish to call or write your career management branch regarding an assignment or other aspects of your career, the address is: U.S. Army Military Personnel Center; ATTN: DAPC-EPL-E; 2461 Eisenhower Avenue; Alexandria, VA 22331. The telephone number is Area Code 202, 325-7710/11/12 or Autovon 221-7710/11/12.

Engineer career advisors include: Master Sergeant Kelly Brown, CMF 81, Drill Sergeants (Fort Leonard Wood only), MOS 12Z and 12B for E-7 (P); Sergeant First Class Al Henderson, CMF 12 Combat Engineering; and Sergeant First Class Billy W. Moore, CMF 51 General Engineering.

SQT REVIEW

The Army is considering reducing or eliminating the written portion of the Skill Qualification Test (SQT) for E-1 through E-5 in combat arms MOS, including MOS 12B, Combat Engineer.

Similar changes may be in store for soldiers in combat support and combat service support MOS, according to TRADOC officials.

Trainers, personnel managers and units in the field have been reviewing the SQT based on tests conducted in combat arms MOS. Decisions were expected by September, with changes to be implemented early next year.

The SQT is intended to test a soldier's ability to do his job rather than his ability to answer written questions. SQTs conducted over a three-year period in combat arms MOS show that soldiers improve progressively on the hands-on and performance certification portions. Improvement on the written test, however, has been "modest or uneven."

In addition to reviewing the written portion of the test, officials have been looking at the various standards established for the SQT and whether these standards provide a workable and equitable system for determining eligibility for promotion and reenlistment.

APPRENTICESHIP PROGRAM

More than 11,000 soldiers, including many engineer soldiers, are using their Army training and work experience to prepare themselves for civilian jobs. They're making sure their Army training doesn't go to waste by applying their work experience toward becoming qualified journeymen in a skilled trade or craft.

Currently registered with the U.S. Department of Labor's Bureau of Apprenticeship and Training (BAT) are no less than 15 engineer programs and 23 engineer-oriented MOS. listed below.

PROGRAM	MOS
Plant Equipment Operator	62H,62G
Grading & Paving Equip. Operator	62E
Heavy Duty Repairman (Construction Equipment)	62B
Universal Equip. Operator (Construction Equip.)	62F
Carpenter	51B
Plumber/Pipefitter	51N
Electrician	51R
Lithographer (Offset Press Operator)	41K,83E, 83F
Drafter (Architectural)	81B
Refrigeration/Air Conditioning Repairer/Servicer	52C
Firefighter	51M
Industrial Electrician-Repairer	52E
Powerhouse Electrician/Repairer	52E
Surveyor (Engineer)	82A,82B, 82D
Rigger	12B,12C, 51C,51H

Apprenticeship terms range from one to five years or from 2,000 to 10,000 hours, depending on the trade or skill. Each 2,000 hours of work experience also requires 144 hours of related instruction.

To participate, soldiers must be working in a primary or secondary MOS that is part of the program. Soldiers may transfer from one program to another, but they cannot participate in more than one program at a time.

To enter the program, soldiers must visit their local education office to complete an application form. Their past work experience will be evaluated and they will receive a DA Pamphlet 621-series which lists the number of hours required and Army Correspondence Courses available if needed.

Each soldier is responsible for recording work experience hours in a log book. Hours are recorded daily and once a week the soldier's immediate supervisor must certify the log book.

Upon completion of the program, a certificate is awarded from the Department of Labor. Although this certificate will not guarantee a civilian job, it will make former soldiers more competitive with civilians in the trade.

For more information, soldiers should contact their local education office.

OCS DEADLINES

Enlisted personnel interested in attending Officer Candidate School will have to wait until next year unless they have already submitted a compelted DA Form 61, Application for Appointment, to MILPERCEN. The deadline for receipt of applications for OCS Class 1-80, with a starting date of 18 November, was 17 August. Applications for Class 2-80, scheduled to start on 3 february 1980, must be received by MILPERCEN no later than 5 November. The deadline for receipt of applications for Class 3-80, scheduled to start on 6 April 1980, is 7 January.

SOCAD PROGRAM

Six American colleges and universities have agreed to extend their Servicemen's Opportunity College Associate Degree (SOCAD) program to soldiers overseas. The program standardizes procedures for academic evaluation of, and college credits for, military schooling, experience, and training for more than 70 educational institutions. The program provides flexible credit transfer options and adjustable residence requirements leading to an associate degree. The SOCAD program was originally designed for soldiers in combat arms, but has been expanded to meet the needs of soldiers in other career fields. Soldiers interested in the program can get full details from their local education services office.

"CODE-A-PHONE"

Soldiers wanting information about the Army Correspondence Course Program (ACCP) or wanting to check the status of a course they are now taking, can get answers direct from the Training and Doctrine Command (TRADOC) by a new "code-a-phone" service.

Training specialists will answer soldiers' questions via phone. Or, if soldiers call after duty hours, they may leave a recorded message and have their questions answered when their call is returned the next work day. If soldiers do not have access to an Autovon line, their questions will be answered by mail.

The number for ACCP information is Autovon 927-3085 or commercial 804-878-3085.

We need your help. Whenever a significant change in your local assignment, duty position, marital status, area of preference, etc., occurs, take a few minutes to prepare an updated copy of your DA Forms 2-1 and 2635.

ARMY DIVERS NEEDED

Enlisted personnel in grades E-2 through E-4 interested in becoming Army divers should submit a formal school application through channels to HQDA, ATTN: DAPC-EPL-E, 2461 Eisenhower Avenue, Alexandria, Virginia 22331.

Applicants must meet all prerequisites in AR 611-75, paragraph 2-2. Personnel accepted will attend a 12-week Second Class Diver Course at the Navy's Diving and Salvage School in Washington, D.C. Upon successful completion of the course, soldiers will be awarded MOS 00B10 and further assigned to the Engineer Hard Hat Diving Unit.

EERWA DATA

The Enlisted Efficiency Report Weighted Averages (EERWA), as of 31 March 1979, were as follows:

Pay Grade	EERWA
E-9	124.41
E-8	123.73
E-7	122.19
E-6	120.25
E-5	117.82
E-4	113.94

NCO Channels

ACADEMIC GRADING POLICIES

Students reporting to the U.S. Army Engineer School to attend the Engineer Advanced Course should be fully aware of the current grading standards applied to professional development courses.

Students must pass each examination with a grade of 70 percent or higher in order to receive a passing score. If the student fails to achieve at least 70 on the first examination, he is retested following remedial training in the deficient areas. If he fails the retest, his academic record will be reviewed by the Professional Course Review Committee, which is composed of senior NCOs detailed to the board.

The Professional Course Review Committee will convene twice during the course, upon conclusion of the common phase of training, and after completion of the entire course. Upon completion of the common phase, the committee will review the academic record of all students who have failed a retest on one or more examinations. Based upon the student's academic record, the committee may recommend any of the following actions:

Continue the course—based upon the premise that the student will benefit from the instruction although he may not graduate.

Referral to the Faculty Board—Faculty board may grant additional tests or recommend relief from the course, depending on the student's academic records.

Upon completion of the course, the Committee wil again review all academic records of students who have failed one or more retests in the entire course. This review will include an academic evaluation as well as the "whole person concept." Based upon these two areas, the committee may recommend the following actions:

a. Administrative Pass—graduation with diploma.

b. Certificate of Attendance—Unsuccessful Completion— Students *may* be given an option to complete specific correspondence subcourses to meet course requirement within a one-year period. Upon satisfying course requirements, the student is issued a diploma.

Academic averages are used to determine a general ranking of students which will be annotated on the Academic Evaluation Report DA Form 1059. Four categories identify student achievements as follows:

"Exceeds Course Standards"—Limited to 20 percent of class enrollment, it includes only those students who achieve the highest academic averages, exceeding 90 percent.

"Achieved Course Standards"—Includes all students who do not "exceed course standards," but pass each examination with a score of at least 70 percent.

"Marginally Achieved Course Standards"—Includes students who "fail to achieve course standards" due to their failure on retests. These students are given the opportunity to earn their diplomas by completing additional academic work in a specified period of time or they may be granted an "administrative pass" for the course. Diplomas are awarded to these students.

"Failure to Achieve Course Standards"—Includes students who fail to achieve a passing grade of 70 percent from any element of the course.

These grading standards reflect The Engineer School's current policy that students must be proficient in all academic areas. Students failing to achieve the minimum score of 70 percent on the first examination receive reinforcement training and are retested in the subject area. If the student then receives a passing score, he has profited from the reinforcement training and testing.

Academic Evaluation Reports: Effective with the Engineer Advanced NCO (ENCOA) Class which graduated in May, corrected copies of academic evaluation reports are no longer being used. Previous policy permitted The Engineer School to issue corrected copies of academic evaluation reports once the student had completed course requirements.

Academic Evaluation Reports: Effective with the Engineer Advanced NCO (ENCOA) Class which graduated in May, corrected copies of academic evaluation reports are no longer being used. Previous policy permitted The Engineer School to issue corrected copies of acadmic evaluation reports once the student had completed course requirements.

Students who fail to achieve course standards and are given an option to complete a specific correspondence subcourse, will have a notation placed in block 16 of the DA Form 1059 as follows: "A certificate of attendance is issued at this time. A diploma will be issued upon successful completion of the following sub-courses within a one-year period."

Upon completion of course requirements, copies of the diploma with a letter of explanation, will be forwarded thru the same distribution channels as the academic evaluation report, to include the soldier's Official Military Personnel File.

NEW TOP-LEVEL NCOs

Personnel reassignments this summer at the U.S. Army Engineer Center and School have resulted in new senior Noncommissioned Officers for both the center and the school's Directorate of Training Developments.

The new post CSM is Frederick I. Eisenbart, Jr., who just completed a tour as the Command Sergeant Major of the DA Military Personnel Center. CSM Eisenbart replaced CSM Lucion L. Cowart, who departed for Korea in June.

CSM Eisenbart has an extensive background in combat and general engineering and has served most of his Army career in the Corps of Engineers. He is a graduate of the Sergeants Major Academy and numerous schools of engineering. His 26-year career has included assignments as First Sergeant, Command Sergeant Major of several battalions, and Command Sergeant Major of an engineer brigade.

The new Sergeant Major of The Engineer School's Directorate of Training Developments is SGM Waverly George. He is now the key point of contact for field units in the areas of individual and collective training. If you have a problem or just need information on Skill Qualification Tests, Soldiers Manuals, ARTEPs, correspondence courses, or TEC, SGM George is the person to contact at The Engineer School. Letters and ohter correspondence may be addressed to: Commander, U.S. Army Engineer School, ATTN: SGM George, DTD, Fort Belvoir, VA 22060.

Reserve Components

ITSCHNER AWARDS

The annual Itschner Award winners for the Reserve Components were announced in the Spring edition of ENGINEER and honored at the annual Engineer Dinner May 11 at the U.S. Army Engineer Center and Fort Belvoir. The USAR winner was the 332nd Engineer Company (Dump Truck) of kittanning, PA, commanded by Captain Ernest M. Cooper. The ARNG winner was Company C, 612th Engineer Battalion, Norwalk, OH, commanded by Captain Dale L. Liebenthal. The Itschner Award is named for Lieutenant General Emerson C. Itschner, a former Chief of Engineers.

NEW ENLISTMENT OPTION

A "3x3" enlistment option for non-prior service males was initiated 30 May. The new option allows a three-year unit/three-year control group obligation. Men who select the 3x3 option are not eligible for enlistment bonuses, educational assistance, or the split training option. Since 1975, males age 17-25 have had the choice of only two options—the "6x0" option in which all six years are served in a unit, and the "4x2" option which calls for four years in a unit and the other two years in a control group.

SCHOOL APPLICATIONS DUE

Applications for most 1980 school year courses are due, through command channels, by 1 November. Included are applications for the Army War College, the National War College, Logistics Executive Development Course, Command and General Staff College, and the Industrial College of the Armed Forces. Warrant Officer Senior Course applications were due at DA in August fo the January 1980 class; applications are due at DA by January for the June 1980 course. Applications for all courses are submitted through command channels. Check with unit training officials for further guidance and eligibility.

TRAINING SCHEDULES

Subparagraphs 3-3e and 3-3f of AR 140-1 explain how USAR unit commanders may select training schedules to best suit their unit's needs. The reg breaks out the allowable limits of choosing individual Unit Training Assemblies (UTA), Multiple Unit Training Assemblies (MUTA) or combinations of the two. There are restrictions on the percentage of a unit's total training hours which may be scheduled within any one month or three-month period. Only area commanders may authorize deviations from the percentages. Under no circumstances will the authorization allow individual unit members to exceed 48 training assemblies a year.

OVERSTRENGTH APPROVAL

DA has approved a new policy, allowing CONUSA commanders the authority to approve requests from subordinate units to exceed the 110 percent enlisted overstrength ceiling. There are some additional ground rules. The unit's parent USAR command (ARCOM or GOCOM) cannot exceed the 110 percent ceiling, and the CONUSA cannot exceed 103 percent of its enlisted strength. Also, a unit cannot recruit over the 110 percent ceiling if there are no other units within normal commuting distance under the 110 percent level. Members recruited under the policy must be informed that, upon mobilization, they may be reassigned anywhere the Army has a requirement.

UPDATE ON SRIP

The expansion of the Selected Reserve Incentive Program (SRIP) to all USAR units ended in June, but commanders who are still eligible to offer enlistment incentives are encouraged to keep providing referrals and to stay closely in touch with the unit's supporting recruiters.

PRIMARY LEADERSHIP COURSE

The Primary Leadership Course is the first leadership and management course approved for E-4s and E-5s with non-combat skills. USAR schools offer a self-paced PLC which closely parallels the Active Component course. More than 4,000 soldiers are currently enrolled. At the present time, several community colleges, mainly in the states of Washington and California, offer academic credit in personnel management for successful completion of the PLC. Community colleges in other states are reviewing PLC content, and more schools are expected to grant credit for it. USAR school commandants are urged to submit the PLC curriculum to local colleges and universities for evaluation.

NCOs SOUGHT FOR NCOLP

The Non-commissioned Officer Logistics Program is available for NCOs in grades E-6 and above. The program includes an intensive 9-week resident course at the Army Quartermaster School at Fort Lee, Virginia. A non-resident NCOLP course is also available. To be eligible, NCOs must be high school or GED graduates, and be qualified in an MOS within Supply and Service, Transportation, or Maintenance. Chapter 13 of AR 614-200 spells out all requirements. Both unit and Individual Ready Reservists are urged to take advantage of NCOLP. Other references include DA Pam 600-8 and AR 604-5.

LONG TOUR MANAGEMENT PROGRAM

DA has approved the establishment of a USAR Long Tour Management Program, designed to improve the quality and professionalism of the long tour USAR force. The program also seeks to more effectively control spaces and personnel assigned. DA Circulars 140-14 (for officers) and 140-13 (for enlisted personnel) spell out the details. A Long Tour Management Board met during the summer to review all officers on tour and all new applications, and also to provide an order of merit to be used to fill future vacancies.

RECRUITING PARTNERSHIP

The last of 57 District Recruiting Commands (DRC) assumed the USAR recruiting mission in May, thus fully implementing the USAR-USAREC partnership. All Reservists should play an active role in the partnership by making referrals to the recruiters who support their unit. The new USAREC/FORSCOM Regulation 601-67, USAREC/USAR Referral Program, spells out the procedures. Remember the formula—quality referrals equals more USAR accessions equals successful partnership.

The School Solution

TIME REQUIREMENT

Nine bays are required to cross 170 feet (Table 6-1, FM 5-34). Assembly time is five minutes per bay, or a total of 45 minutes, under normal conditions. However, weather and blackout conditions must be considered, along with the time required to install a BEB temporary anchorage system.

A factor of 50 percent must be added to the erection time due to blackout conditions, while a 30 percent factor has to be included due to the frigid temperatures. Allow approximately 9-10 minutes for installation of the BEB temporary anchorage system. The net result is a final estimate of 90 minutes for construction of the Ribbon Bridge.

PERSONNEL REQUIREMENT

Since two, rather than three, launching sites are to be considered in estimating the required troop strength, and since the requirement for a fixed anchorage crew has been eliminated, the figures in Table 6-11, FM 5-34 must be adjusted. The final estimate is four NCOs and 36 enlisted per personnel. Officer requirements may be added as necessary.

EQUIPMENT REQUIREMENT

From Table 6-9, FM 5-34, you determine that two bridge bay ramps and seven bridge bay interiors are required to span a distance of 170 feet. Bridge bay ramps may be adjusted to compensate for the extra 20 feet in length of the nine bridge bays.

The number of bridge erection boats required is determined by the number of launch sites (2), the number of required bays (9), and the stream velocity (6 FPS). The estimated requirement is seven boats, which can also be used for the anchorage system after bridge erection is completed. Since one M-812 Transport Vehicle is required for each bay and erection boat, 16 vehicles are required.

OTHER CONSIDERATIONS

Bridge erection time may be considerably longer depending on (1) the speed and skill of personnel involved, (2) the availability of necessary equipment, (3) weather conditions, and (4) miscellaneous factors which could hinder mission accomplishment.

Troop strength estimates are based on assumed availability. Use of additional launch sites and a fixed anchorage system would increase the number of troops required and would, likewise, lengthen the time required for completion.

The equipment estimate is the minimum required to accomplish the mission. Back-up and safety equipment, as well as command and control vehicles, should be on hand in case of equipment failure on site.

ENGINEER "HOTLINE"

The U.S. Army Engineer School at Fort Belvoir, VA, has established a 24-hour "Hotline" to answer questions from the field on subjects such as TO&E organization, doctrine, materiel, MOS, training literature, Skill Qualification Tests, etc. Engineers using the Hotline must provide their name, unit, address and telephone number in order to get answers to their questions. The Hotline number is Autovon 354-3646 or commercial 703-664-3646. Questions will be referred to the appropriate activity within The Engineer School. Callers will be contacted by telephone and/or in writing as soon as possible.

CORPS DESIGNATED AS MACOM

The U.S. Army Corps of Engineers (USACE) was designated as a Major Army Command (MACOM) on 16 June, the 204th anniversary of the founding of the Corps. The new command consists of the Office of the Chief of Engineers, the Engineer divisions and districts, research and development laboratories, and other assigned field agencies. Excluded are members and units of the Corps of Engineers' branch of the Army, such as combat and construction engineers, facility engineers, and other engineer organizations which are part of other MACOMs. The Corps remains a DA staff agency with the Chief of Engineers serving as both head of the agency and commander of the new MACOM. Traditional oversight of Corps programs by Congressional military and public works committees and the Executive Branch remains unchanged. The establishment of the Corps as a MACOM is expected to clarify the Corps' functions and relationships within the Army.

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The Bridge at Remagen

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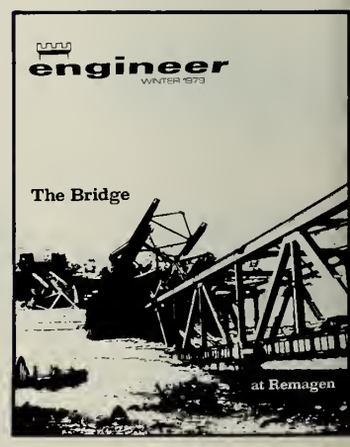
THE COVER

German demolitions, artillery bombardment, and continuous heavy traffic led to the collapse of the Ludendorf Bridge at Remagen on 17 March 1945. But not before U.S. engineers had constructed a lifeline of supplementary bridges which enabled the Allies to press the offensive against the Nazi forces. See page 8 for the complete story.



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VOLUME 9 WINTER 1979 NUMBER 3

FEATURES

4 **BRIDGING FOR THE 1980s AND BEYOND**
by Hal Dotterer

8 **THE BRIDGE AT REMAGEN**
by Lieutenant Ronnie Chai Chang

12 **INTEGRATING ENGINEERS INTO THE COMBINED ARMS TEAM**
by Captain Dale Robertson

15 **WINTER REFORGER 79: LESSONS LEARNED**
by Colonel Jerome B. Hilmes

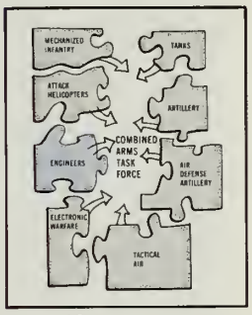
18 **TACTICAL EMPLOYMENT OF ATOMIC DEMOLITION MUNITIONS**
by Captain John F. Rybicki

22 **THE COMBAT HEAVY BATTALION IN FORWARD SUPPORT**
by Major Francis R. Skidmore & Major John R. Mullans

27 **GUIDELINES FOR NEW LIEUTENANTS**
by Captain James B. Norwood

32 **INTERSERVICE COOPERATION PAYS OFF AT TAEGU**
by Lieutenant Michael Hullihan

page 7



page 13

page 18

DEPARTMENTS

2 **NEWS & NOTES**
34 **ENGINEER PROBLEM**
35 **RESERVE COMPONENTS**
36 **OFFICER CAREER INFO**
37 **COMMANDER'S UPDATE**
38 **ENLISTED CAREER INFO**
40 **THE SCHOOL SOLUTION**

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News & Notes

ANNUAL TRAINING

Specialist Five Andrew B. Hill, a heavy equipment operator assigned to Company A, 926th Engineer Battalion, Birmingham, AL, puts a scoop loader to good use during annual training at Camp Shelby, MS. Training activities for the 926th and its subordinate units included the preparation of runways, minefields, fire breaks, tank and drainage ditches, and other construction projects. (USAR photo by Paul Adams)

ENLISTEE TREATMENT STANDARDS

A recent TRADOC directive has established new standards for treatment of Army recruits. The changes will be apparant from the moment a new enlistee reports to his reception station. "Shock will not be used on receptees by RECSTA cadre," according to the TRADOC directive. Such traditional practices as making receptees stand at a brace, run on and off buses with luggage, and other forms of harassment are now prohibited. So is the "skinhead" haircut. Trainess may now wear mustaches in accordance with Army regulations. The philosophy underlying these changes is to "train soldiers by building on their strengths and by shoring up their weaknesses. It is not to tear them down and build them up again." These changes resulted from an eight-month review of entry training at nine Army training centers.

TOPO SUPPORT SYSTEM

A modern system to provide critical terrain data to tactical commanders is on the way. A $16.4 million contract to produce 42 units of the Topographic Support System (TSS) has been awarded to the American Development Corporation of South Carolina. Initial fielding of the TSS, designed to improve the capability of field topo units, is anticipated in 1982. TSS will consist of seven interdependent subsystems, including map reproduction; storage, retrieval, and distribution of topo information; on-site terrain data collection; survey support; cartographic revision; mosaicking, drafting, and rectification; and command and control.

CORPS REASSIGNMENTS

MG Harry A. Griffith and **MG Bennett L. Lewis** have been appointed as commanders of the Corps' Ohio River and North Atlantic Divisions, respectively . . . **COL Maximilian Imhoff** has been appointed as the first commander and director of the Corps' new Water Resources Support Center at Fort Belvoir, VA . . . **Lloyd A. Duscha** has been selected as the new Chief of the Engineering Division, Civil Works Directorate, OCE . . . **COL Samuel P. Collins, Jr.**, has been appointed as district engineer for the Corps' Vicksburg District . . .

$1 BILLION CORPS PROJECT

The Corps of Engineers is the construction agent for a $1 billion project to design and construct two strategic air bases in Israel. Construction has already begun and is scheduled for completion within three years. Construction will include runways and parking aprons, aircraft shelters, and other operational and support facilities, including utilities, roads, and housing. A Corps of Engineers staff in Tel Aviv and at two site offices is managing the construction effort. The new bases will be located near Be'er Sheva and Elat in the Negev Desert.

JOB ESTIMATING SYSTEM

The Directorate of Engineering and Housing, US Army Support Command, Hawaii has implemented a minicomputer based Job Estimating System (JES) for use in preparing detailed work estimates. The system is designed for use with the WANG 2200T minicomputer. The system delivers a more accurate detailed estimate and reduces the total estimating hours by 40 percent, thus allowing Integrated Facilities System inspections to be conducted without hiring additional personnel.

RUNWAY REPAIR EXERCISE

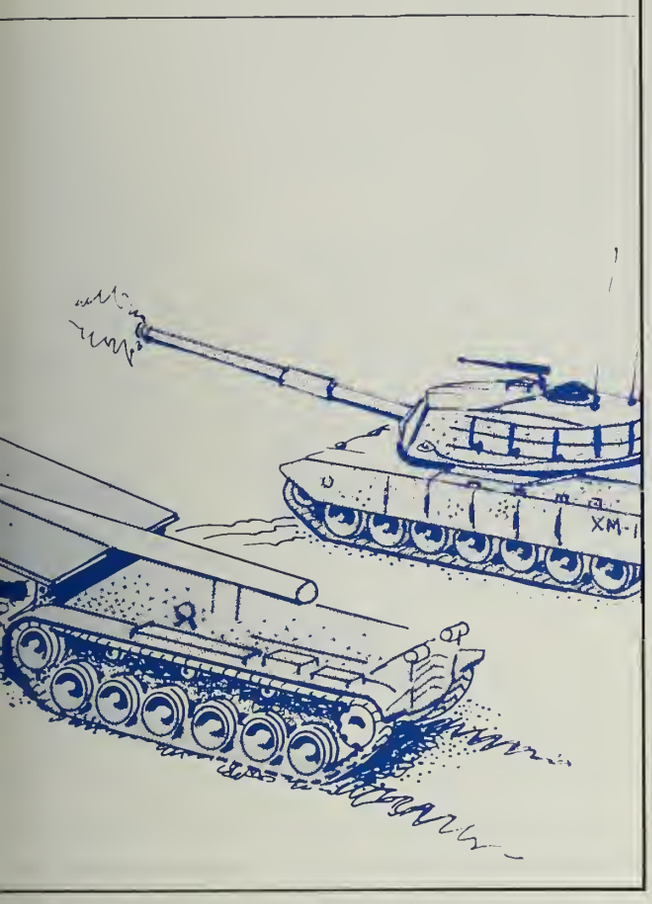
Filling and compacting craters was just one of four crucial tasks accomplished by members of A Company, 27th Engineer Battalion (C) (A) during FTX SOLID SHIELD in May. Never before had the Army tested its entire package of runway repair by an airborne combat engineer assault force. The air drop included two dozers, four loaders, five trucks, two jeeps, an air compressor, and a pioneer tool trailer. Within six hours of the drop, Alpha Company engineers had derigged and assembled all equipment, cleared all airfield craters and vehicle hulks of mines and anti-handling devices, and filled and compacted all craters. Compaction by the 250 CFM air compressor above was successful due to a combination of good weather and small craters, but larger craters and/or bad weather would have created a more serious challenge. Thus, inclusion of a 13-wheeled roller, a sheepsfoot roller, and/or a vibrating compactor in the repair package is being considered.

BRIDGING FOR THE 1980s....

by Hal Dotterer

Few are aware of the development program going on at Fort Belvoir as well as in Germany and England which, when successfully completed, may require revolutionary changes to US and NATO tactical bridging concepts of operation and organizational structures. It will certainly enable us to launch bridges across a wider range of gaps under assault or near assault conditions in just a matter of minutes.

The objective of the program, known nationally as "Bridging for 1985 and Beyond" (BRG 85[5]) and internationally as "Bridging in the 80s", is to develop a family of bridges with a common bridge girder that will be used in all three tactical bridge roles, i.e., assault role, dry support role, and wet support role. All bridges will be mechanically launched and retrieved by a common launch mechanism mounted on either a national main battle tank chassis or a special wheeled vehicle, each with a two-man crew. Girder reinforcements, such as a cable reinforcing system for long, clear-span bridges, or piers for multi-span bridges, will also



be included in the family. All bridges will be designed to accommodate military load class (MLC) 70 tracked loads.

Assault bridges will vary in length from 17 to 31 meters (in 7-meter increments) with launch times of three to five minutes.

Dry support bridges (fixed bridges) will vary in length from 17 to 52 meters (in 7-meter increments). Launch times will be 10 to 30 minutes by one to three wheeled launchers. The cable reinforcing system will be required for bridges over 31 meters long. Bridges longer than 52 meters will be possible using piers. Piers may also be used to increase the load classification of dry support bridges to enable them to accommodate the Heavy Equipment Transporter (HET) loaded with the XM1.

Wet Support bridges (float bridges) will vary in length (in 14 meter increments) with emplacement rates of six meters (20 feet) per minute.

Mounting the assault bridge on the XM1 chassis will afford the cross-country mobility and crew protection needed to provide close support to tank equipped assault elements. The wheeled transporter/launcher will be designed to provide the on-road speed and maneuverability needed to keep pace with support elements. Wheeled transporters/launchers will also be designed to provide the off-road mobility needed to reach bridge launch sites.

The need for the system is tied directly to the perceived threat in Europe in the 1990-2000 time frame. In this environment, tactical bridging operations within the division and corps area will be opposed by an enemy with sophisticated battlefield surveillance and reaction capabilities. The threat will come from manned surveillance aircraft, tactical aircraft capable of accurate ordnance delivery, and conventional and guided artillery.

Bridging missions, therefore, must be completed before enemy forces can damage or destroy the bridge. To do so, bridges must be built, essential traffic must cross, and the bridge dismantled and relocated before the tactical air or artillery threat is applied. Erection time for current US hand erected bridge systems, particularly dry support bridges, are too slow to defeat the threat. Even the current Armored Vehicle Launched Bridge (AVLB) system, which can emplace a bridge 63 feet/19.3 meters long in 2-3 minutes, is limited by the fact that it cannot be extended when the gap width exceeds 60 feet/18.3 meters.

The logistical support requirements of current US tactical bridges is compounded by the fact that there is no commonality between the several bridge systems in the inventory. Each requires different assembly and disassembly procedures. Several different transport vehicles are required. None of the

....and BEYOND

current bridge systems are designed to connect to any of the other systems when the assets of diversely equipped bridge units are required to span a major water barrier.

Development of this new bridge system requires that we reexamine current operational concepts for all three bridge roles and change them where necessary to take advantage of the improved capabilities of the new system and the unique benefits offered by a common girder. The organizational structures of bridge units will have

Prototype 31-meter bridge on the wheeled transporter/launch vehicle

to be revised drastically as a mechanically launched bridge system replaces the remaining manpower-dependent, hand erected bridges in today's inventory.

ASSAULT BRIDGE EMPLOYMENT

Essentially, the day-to-day employment of assault bridges will follow operational procedures similar to those used with the current AVLB, with one notable exception. That is, to implement a recent doctrinal decision, all of the assault bridges in the division will be centralized in the divisional engineer battalion and operated by AVLB sections of an AVLB platoon organic to each engineer line company. The traditional close association between engineer line companies and maneuver elements will ensure that assault bridges are located well forward, thus enabling them to support assault crossings by combined arms teams.

When its emplacement is approved by the crossing force commander, the bridge is brought forward under the over-watch fire of the lead tactical elements and emplaced quickly. The bridge will move by the most direct route to the crossing site, remaining on-road where possible. Bridges emplaced by an assault bridge section will be retrieved by the same section when the bridge is no longer needed by the assault force, *unless* a bridge is required at that location for follow-up and combat service support traffic. In such cases, the bridge will remain in place and a replacement bridge for the assault launcher will be provided by the support Bridge Section of the battalion.

This change to the assault bridge concept of operation is proposed in order to take advantage of one of the benefits offered by the common girder. With the BRG 85+ system, the old concept of replacing an assault bridge with a support bridge will no longer be valid, since the replacement support bridge will be identical to the assault bridge being replaced.

Engineer AVLB platoons (one per line company, four per divisional engineer battalion) will be equipped with six launchers, six 24-meter bridges, and three pier modules. This allocation will enable each launcher to carry either a 17 or 24-meter bridge as determined by gap reconnaissance reports. By combining platoon assets, 31-meter bridges can be launched under assault conditions, while 38 and 45-meter bridges can be launched under near-assault conditions (some exposure of personnel). Again, by combining platoon assets, bridges 24, 31, 38, and 45 meters long each capable of accomodating the HET with XM1, can be launched under near-assault conditions.

DRY SUPPORT BRIDGE EMPLOYMENT

Dry Support Bridge assets of the Divisional Engineer Battalion/Separate Brigade Engineer Company will be used to back up AVLB capabilities by replenishing armored launchers when the bridges they have laid are to remain in-place for combat support/combat service support traffic. Dry support bridges will also be emplaced

within the division area to facilitate lateral movement of maneuver elements and combat support/combat service support traffic by bridging wet or dry gaps up to 51 meters wide. Dry support bridges will be emplaced by the Support Bridge Section of the divisional engineer battalion/separate brigade engineer company at locations selected in coordination with the division G3/brigade S3 and approved by the division/brigade commander.

After the bridge site has been reconoitered and it has been determined that the required span is within the capability of a dry support bridge, a bridge girder, tailored to span the gap, will be assembled (using organic MHE, i.e., crane or wrecker). After picking up the assembled girder, the wheeled transporter/launcher(s) will proceed, on order, to the bridge site to launch the bridge. Travel will be on-road as much as possible. Cross-country travel will be used only when necessary to by-pass obstacles and to reach off-route launch sites.

Each Support Bridge Section (two per Division Engineer Battalion, one per separate Brigade Engineer Company) will be equipped with three wheeled launchers, one 31-meter bridge, two 24-meter bridges, one pier module, and one cable reinforcing module. This allocation will enable each section to span a variety of wet or dry gaps from 16 to 51 meters wide and reinforce one 30-meter bridge to accomodate loads such as the HET loaded with the XM1. Multiple crossings (up to three) will be possible across gaps of 23 meters or less.

Dry Support Bridges of the Corps Bridge Company will be used to supplement divisional bridge capabilities by providing additional bridging as required, by spanning gaps that exceed the capabilities of the divisional battalion's Support Bridge Section, and by emplacing reinforced bridges capable of accommodating HET/XM1 loads across gaps greater than 30 meters wide. Dry support bridges will be emplaced by the Dry Support Platoon of the Corps Engineer Bridge Company. The platoon will be equipped with four wheeled transporters/launchers, four 31-meter bridges, six pier modules, and two cable reinforcing modules. General purpose transportation, i.e., flat bed trailers, will be required for movement of the pier and reinforcing modules.

WET SUPPORT BRIDGE EMPLOYMENT

Under this proposed organizational and operational concept, the corps bridge company would provide the only float bridge capability within the division/corps area. The basis for this revolutionary change in concept is the fact, established by gap distribution studies, that a vast majority of gaps throughout the world are under 30 meters wide. In Europe 96.9 percent of all gaps are 30 meters or less and 97.5 percent are 50 meters or less.

A 24-meter bridge on an M60A1 chassis during mobility tests

Based on these studies, the BRG 85+ dry support bridges allocated to the divisional engineer battalion will be able to span, in 30 minutes or less, 97.5 percent of all gaps that the division may expect to encounter. Since the locations of all major water barriers are well known, adequate planning and coordination for a major river crossing operation will ensure that the wet support bridge capabilities of the corps bridge company are provided as required to cross the remaining 2.5 percent of gaps.

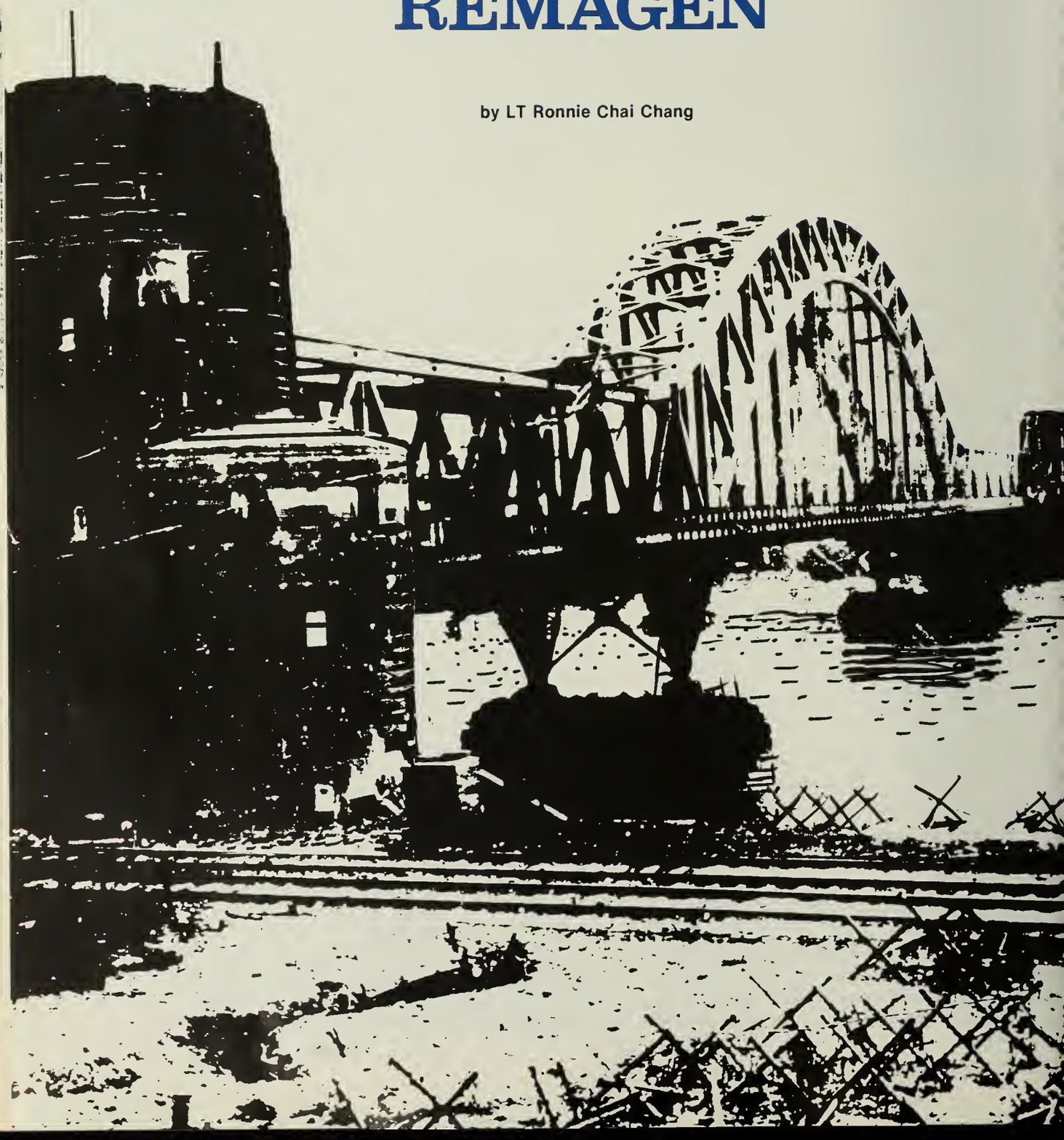
Wet support bridges will be emplaced by Wet Support Platoons of the Corps Engineer Bridge Company. Each of three platoons will be equipped with ten wheeled transporters/launchers, 16 seven-meter interior bays, and four 8.5-meter ramp bays. This equipment will enable each platoon to build one 129-meter bridge or two 31-meter rafts.

Those who must look into the future and dare to predict when things are likely to happen say that this new family of bridges should be ready for field service by 1989. Realistically, much can, and usually does, happen to a research and development program over a ten-year period. Optimistically, all that we hope for will come to fruition. On the other hand, we may have reached too far. We'll see. Nevertheless, once in awhile it is good for the spirit to take an optimistic look into the future.

Hal Dotterer, a previous contributor to ENGINEER, is a Combat Development Materiel Analyst with the Materiel Systems Division, Directorate of Combat Developments, USAES, specializing in military bridge systems.

The Bridge at REMAGEN

by LT Ronnie Chai Chang



While engineers labored to complete repairs to the bridge, rivets in the steel arches began to shear, popping like rifle shots. Within seconds, the bridge rotated to the upstream side, pulled its approach spans off their rollers, and dropped into the river. But the bridge had served its purpose. Other means for crossing the Rhine, at or near Remagen, had been established.

First Army engineers began planning to cross the formidable Rhine River barrier while participating in the Allied drive through Belgium during July 1944. By mid-September, tons of Class II and Class IV bridging had been stockpiled, but by 22 October, prospects for an early crossing had faded due to the stiff Nazi resistance.

In February 1945, the Allied High Command decided the First Army was not to cross the Rhine. Stockpiling of bridge equipment ceased and bridge units were transfered elsewhere.

By early March, III Corps of First Army had reached Cologne on the Rhine. The rest of First Army wheeled southeast to strike the enemy flank and rear in the Eifel region bordering the Rhine and to link-up with Third Army slicing up from the south toward the confluence of the Rhine and the Moselle Rivers. Hopes of finding intact bridges over the Rhine were virtually non-existent as the Germans destroyed dozens of bridges along the vital barrier.

The Ninth Armored Division was disposed to the right flank of the southeastern pincer of III Corps to facilitate a crossing of the Ahr, a Rhine tributary and the subsequent link with Third Army. In their path lay the small rail junction town of Remagen, on the west bank of the Rhine. Significant only in that it contained the Ludendorff rail bridge, Remagen did not figure in any plans for a crossing.

The ruggedness of the terrain in the Westerwald region across the bridge and the poor quality of roads from the west were unsuitable for tanks and any large maintenance and depo installations necessary to support a major river crossing. Without its bridge, Remagen was just another milestone.

But on 7 March 1945, the Ludendorff Bridge took on great significance when the first scouts of Company A, 27th Armored Infantry Battalion, 9th Armored Division peered down on Remagen. The bridge was intact, still spanning the Rhine, the only bridge left across the great barrier. Poor morale and chaos and confusion in the German Command left an opportunity begging to be exploited.

U.S. commanders reacted swiftly. Lieutenant Hugh Mott, a plattoon leader in Company B, 9th Armored Engineer Battalion, recalled being told by his task force commander: "Mott, General Hoge wants you to get out onto that bridge and see if it's mined or loaded with TNT, and whether it'll hold tanks. I'll give you fire support from my tanks and you'll have infantry scouts out there too." It was a virtual suicide mission.

Enemy gunners across the river could rake the bridge with fire. Even more ominous was the possibility that the bridge might blow at any moment. This possibility was reinforced when the engineer detachment consisting of Mott and two of his most able NCOs set out for the bridge; before they reached it, a hughe geyser of rock and dirt erupted as the Germans blew up the vehicle approach ramp on the western side, leaving a 30-feet crater. But the bridge still stood. The Americans swiftly started across and German machine guns promptly began their deadly clatter.

Across the river, German engineers worked frantically. Their main demoliton circuit had been broken probably by American tank fire and they were prevented from fixing it by that same fire. The Germans then lit the primary cord fuse to emergency demolition charges placed to do the greatest damage. With a tremendous roar, these charges exploded, but, when the dust had settled, the bridge was still standing.

The three engineers ran out and began cutting every wire they could find, bringing great relief to the infantrymen accompanying them. In the middle of the bridge, the engineers climbed down to find four packages of TNT, each weighing 20-30 pounds, tied to I-beams underneath the deck. Working quickly, they cut the wires and dropped the charges harmlessly into the river.

First Army soldiers and equipment pour across the Remagen Bridge

Seconds later, the three men were back on the bridge cutting a heavy cable.

Moving across the bridge, the engineers methodically hunted for the master switch controlling the German demolitions and eventually found it near the eastern end. Cutting the wires leading from it, they returned to look for other caches of explosives. Altogether, the engineers removed 2,000 pounds of explosives placed in approximately 150 separate charges. One of the largest weighed 500 to 600 pounds and was found correctly wired and primed for demolition, and with the fuse cap blown. By that time, other engineers had joined the intrepid threesome and were busy checking the approaches for mines and working on a solution to the huge crater.

Close inspection revealed that the German demolition efforts had inflicted considerable damage. The main multiple panel joint of the eastern truss was blown and some flooring and several floor beams were blown away. Significant engineer repair efforts were required before the Lundendorff Bridge could be utilized by more than foot traffic.

Three main repair tasks were carried out concurrently: repair of the bridge flooring; re-garding of the approach ramps from the bridge to roadways along the Rhine; and strengthening of the vital support panel joint adjacent to the northern pier. All work was carried out under heavy enemy fire, including artillery which at time limited work parties to two-man teams.

Makeshift repairs to shattered planking were effected, utilizing lumber from captured houses in Remagen. Gaping holes were roped off. Cable was stretched to help strengthen parts of the lower chord of the bridge. At midnight 17 March, armored engineers under Mott's direction gave the signal that tanks could cross the bridge.

Nine tanks crossed the Rhine before a tank destroyer fell into one of the holes in the flooring, stuck and effectively blocked further crossing. It was not until 0530 the next morning that engineers dislodged the vehicle after using crowbars and pushing and pulling with other vehicles for hours. Tanks and vehicles again rumbled across the bridge and within 24 hours of its capture, scores of vehicles and some 8,000 troops had crossed to establish a bridgehead.

More than a single lifeline was needed to exploit the bridgehead, however. Within a day or two, only a small fraction of the engineers at Remagen were actually on the bridge itself. First Army's river crossing equipment was pushed forward to bridge parks near the Rhine. Eighteen forward supply dumps were established and over 100 trucks with 5-7 ton semi-trailers were pressed into service.

Ferries were established at three locations by the 86th Engineer Heavy Ponton Battalion: just south of Remagen at the junction of the Ahr and the Rhine; in the center between Remagen and its neighbor, Erpel across the Rhine; and just north of Remagen between the towns of Unkel and Unkelbach. The establishment of ferries at these locations consisted of the assembly of 5-ponton rafts and the grading of approach roads on the Rhine banks. These ferries were operated until 13 March, which time a floating treadway bridge and a heavy ponton bridge were established across the Rhine in the Remagen area.

Construction of the heavy ponton bridge by the 1159th Engineer Combat Group and the treadway by the 1111th Engineer Combat Group began on 10 March. From the onset, engineers suffered heavy casualties from German artillery fire, small-arms fire, and air attack. On the heavy ponton bridge located to the south of Remagen near the Ahr River, 14 4-boat rafts reinforced with pneumatic rubber floats were assembled "by feel" after dark. The next day, under cover a heavy smoke screen, the rafts were anchored into position. The entire bridge, 935 feet long and built for Class 40 loads, was completed in 29½ hours.

The treadway bridge site was also subjected to intense artillery fire. Located just north of the Lundendorff Bridge, it had to be re-built three times after German gunners blasted the first 450 feet. The cost in human lives was seventeen men, all killed by artillery fire. The additional loss of three air compressors helped make the feat of completing the 1,032 feet bridge in 32½ hours even more remarkable.

On 17 March, while engineers labored to complete repairs to the Ludendorff Bridge, rivets in the steel arches began to shear, popping like rifle shots. Within

seconds, the bridge had rotated to the upstream side, pulled its approach spans off their rollers and dropped into the river. Of the 200 men working on the bridge, 10 were killed, 18 missing and 63 injured. The cumulative effect of German demolition charges, artillery and bomb attacks, heavy traffic for five days (until the ponton and treadway bridges were opened on 12 March), and repair efforts utilizing cranes and air compressors, finally brought the old railroad bridge down. However, the bridge had served its purpose. Other means for crossing at or near Remagen, including ferries, ponton, and treadway bridges, had been established.

With the collapse of the Ludendorff Bridge, First Army authorized construction of a Class 40 floating Bailey a mile north of Remagen. In a remarkable engineer feat, the 148th Engineer Combat Battalion built the 1,244-foot bridge on Bailey pontons with 32-foot floating bays in 47 hours and 45 minutes. With the completion of the Bailey, maintenance of troops across the Rhine ceased to be a major problem. Together with other bridges, it made the bridgehead's supply lines secure.

The bridgehead itself proved significant. It not only reduced German morale, but it also directed German forces from strategic locations along the elongated Rhine defense network. Flung piecemeal into savage but disorganized counter-attacks against the Remagen bridgehead, the diverted forces were later helpless to resist subsequent Allied crossings, thus hastening the end of the Nazi Germany.

The engineer effort in preserving the Ludendorff Bridge until supplementary bridges could be built was tremendously significant. Without the lifeline provided by the bridges and ferries, the bridgehead was doomed. And the effort to destroy the Nazi war machine would have been even more costly.

Lieutenant Ronnie O. Chai Chang wrote the above article while attending the Engineer Officer Basic Course at the U.S. Army Engineer School, Fort Belvoir, VA. He has since been assigned to the 1st Engineer Battalion, 1st Infantry Division.

The collapsed Ludendorff Bridge at Remagen

The preponderance of existing guidelines on engineer combat support to the combined arms team is focused at the division and brigade levels. Yet the fluid nature of today's battlefield requires more responsive engineer effort, particularly at task force level. This article addresses the role of the task force engineer in support of a combined arms task force.

Integrating Engineers into the Combined Arms Team

by CPT Dale Robertson

The commander of the Opposing Force (OPFOR) has been assured by his staff that preparations for the attack are well underway. Indeed, he is impressed with the manner in which his subordinate commanders are making spot checks to prevent last-minute delays.

Artillery units move into position and tank crews load their ammunition. Motorized rifle units make last-minute checks of their BMPs.

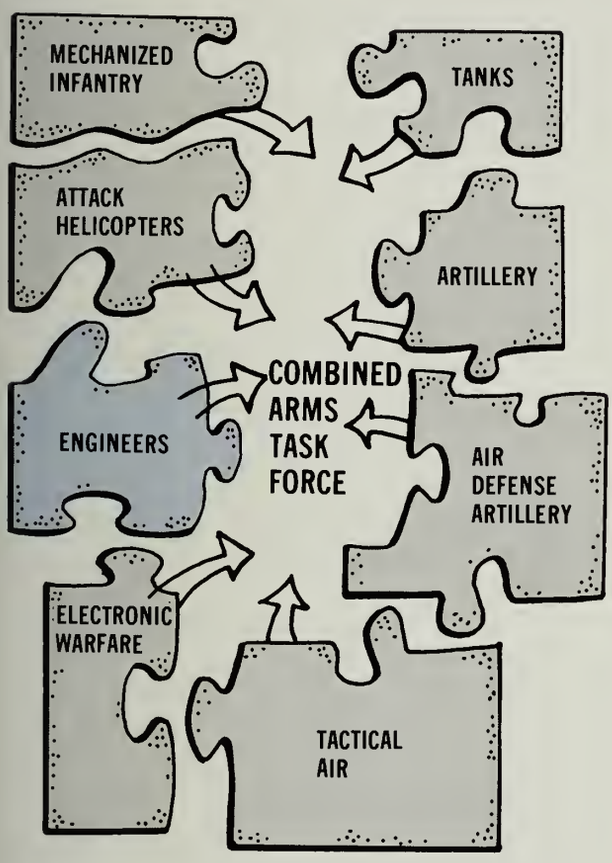
The OPFOR commander knows that he will have to hit hard and advance rapidly if the attack is to be successful. In order to maintain a rapid advance and, thereby, gain a foothold in Western Europe, he also knows that his artillery will have to suppress a large percentage (40 to 60 percent) of NATO weapons, especially antitank weapons.

Assessing his division's numerical superiority over the NATO forces, and combining that assessment with the added assurance of reinforcements, if necessary, the OPFOR commander is very optimistic.

Meanwhile, the commander of the 1st Brigade, 3rd Infantry Division (Mechanized), is planning an active defense to halt the anticipated OPFOR attack. He presents his concept of the active defense to staff members and designates specific responsibilities for each. With his operations officer and Brigade Engineer, he decides where to place rein-

forcing obstacles to best support the tactical plan.

The Brigade Commander makes it clear to his Engineer that lateral points between task forces must be kept open. Hence, obstacles sited along these routes will be reserved demolition targets. Other engineer responsibilities include digging in the Brigade CP, protective slots for the Brigade trains, and maintenance of 20 kilometers of road in the Brigade trains area. The Brigade Engineer analyzes his responsibilities while returning to his



CP. He thinks of the many times he has made similar analyses in the past. But this is different. This is no exercise, this is for real.

Moving quickly, the Brigade Engineer assigns one engineer platoon to each of two task forces (TF 1-7 and TF 1-3) and retains one platoon in general support of the brigade. Task Force engineers quickly attach the equipment they'll need and set out to link up with their respective Task Force commanders.

Arriving early, the Task Force Engineer supporting TF 1-7 analyzes the terrain and identifies those features which may affect his mission. The Task Force commander and his engineer have worked together numerous times before, so that each understands the other's requirements in the active defense. The engineer is confident that his personnel possess the technical skills necessary to support the Combined Arms Task Force. The Task Force commander, acutely aware of the limited manpower and resource constraints of his engineers, will task them accordingly.

The TF 1-7 commander requests specific input from his engineer on how to best use the terrain. How can they structure the terrain to their advantage, while, at the same time, reinforce the terrain with obstacles to the disadvantage of the OPFOR armor. He stresses that all obstacles must be tied in closely with his ATGM and tanks.

The Task Force commander stresses the need for rapid movement from position to position via covered and concealed routes. He knows that if his tanks and APCs can be seen, they can be hit, and if they can be hit, they can be killed. Having presented his mobility and countermobility requirements to his engineer, the Task Force commander details his survivability requirements which require engineer effort. Then he proceeds to prioritize them, based on their importance to his tactical scheme.

Unlike his counterpart supporting Task Force 1-7, the Engineer supporting TF 1-3 does not have a good working relationship with the Task Force commander. In past training exercises, his engineers have been only sporadically integrated into the concept of operations. The TF commander does not identify any specific engineer responsibilities during his initial briefing. Left in the dark, the TF 1-3 Engineer cannot properly allocate his resources to support the tactical plan. His piecemeal efforts are, thus, unproductive.

Meanwhile, the Engineer for TF 1-3 prepares the following list of engineer responsibilities, based on priorities established by the TF commander:

(1) Prepare obstacles to support the antitank weapons systems;
(2) Provide for battlefield mobility;
(3) Prepare hull down defilade and/or protective positions for TOWs, tanks, and APCs;
(4) Dig in Task Force CP;
(5) prepare alternate fighting positions within the Battle Position;
(6) Prepare subsequent Battle Positions in a similar manner;
(7) Construct decoy sites within the Battle Position.

Utilizing the bucket loader and D7 tractor attached to his platoon, the TF 1-7 Engineer and his

men work throughout the night to accomplish their mobility, countermobility, and survivability missions.

Upon his return from Brigade Headquarters, the commander of TF 1-7 Engineer and his men work throughout the night to accomplish their mobility, countermobility, and survivability missions.

Upon his return from Brigade Headquarters, the commander of TF 1-7 summons his Engineer and conducts an inspection of the engineer effort. He finds that the Task Force CP is well dug in, thanks to the tractor dozer. Team A, which includes tank platoon, two infantry platoons, three TOW sections, and a mortar section, have gotten considerable help from the engineer platoon's bucket loader.

The M60A2s of the tank platoon are in hull down fighting positions with only their main guns and cupolas visible. Alternate positions with covered and concealed routes have been constructed. A bridge has been prepared for demoliton and will be executed later to become a dynamic obstacle.

Engineer efforts are equally visible to the Task Force commander at the locations of Teams B and C. Combat engineers are providing technical advice to infantry soldiers during the construction of individual fighting positions and the preparation of proper camouflage. Protective obstacles are being emplaced in front of each team's position to delay and disrupt approaching OPFOR vehicles. Decoy sites are being constructed. The combined arms concept is working!

The commander of TF 1-7 is convinced that engineers have provided his forces with the capability to successfully conduct the active defense when the attack begins.

Unfortunately, the Engineer for Task Force 1-3 is equally convinced that disaster is imminent. Although he had the initiative to allocate his engineers to the various teams within TF 1-3, they had not been integrated into the combined arms team.

Obstacles were not tied in with antitank weapons systems. Indirect fires on obstacles were not preplanned. Routes between positions were often not improved and did not offer natural cover or concealment. Equipment was dug in, but since there were no established priorities, some elements were completely overlooked. Information on the location of subsequent Battle Positions was received only indirectly.

At 0700 hours the following day, OPFOR artillery began their artillery preparation (Podgotovka). Smoke and steel filled the air as both Task Forces scrambled into protective shelters.

TF 1-7 was under heavy bombardment when BMPs came into range of it's antitank weapons. Slowed and canalized by point minefields, reinforced natural obstacles, well-placed road craters, and other prepared obstacles, TOW gunners began to score hits at 3,000 meters.

At 2,000 meters, advancing OPFOR tanks were brought under fire by well-concealed M-60 tanks. Artillery fire kept the advancing armor formations buttoned as friendly tank, TOW, and Dragon gunners continued to destroy enemy tanks.

By moving between hull down positions and taking advantage of the covered and concealed routes between alternate firing positions, TF 1-7's losses were comparatively low. Survivability preparations had been put to a severe test and had passed with honors.

In contrast, TF 1-3's active defense did not fare nearly as well. OPFOR armor maintained a high rate of advance across TF 1-3's front. Since obstacles had not been sited to take advantage of ATGM weapons, few enemy tanks were destroyed. Thin-skinned friendly vehicles such as APCs received exceptionally high losses from OPFOR artillery. TOW weapons were either destroyed or suppressed because they had little or no protection. Inadequate camouflage resulted in OPFOR sagger gunners rapidly locating and engaging exposed M-60 tanks at maximum range. Vehicles moving between alternate firing positions were silhouetted against ridge lines or slowed by unimproved trails, thus contributing to an already high rate of loss.

The result was not surprising. Task Force 1-3 suffered more than 50 percent casualties in the first eight minutes of battle and was declared combat ineffective.

In retrospect, it should be obvious that the commander of TF 1-3 failed to properly utilize his engineer resources. By not assigning priorities of engineer effort, his Engineer was forced to operate in a vacuum. As a result, the engineer potential as a combat multiplier was neutralized.

The lesson is clear. Integration of the Engineer system into the combined arms team must take place during peacetime. There will be no margin for error when the battle begins.

Captain Dale Robertson is currently assigned as an Instructor with the Tactics and Operations Division, Department of Combined Arms, US Army Engineer School, Fort Belvoir, VA. Prior to his current assignment, he was Commander of Company A, 82nd Engineer Battalion, USAREUR.

Winter REFORGER 79:

Lessons Learned

by COL Jerome B. Hilmes

The most startling lesson derived from FTX Certain Sentinel/REFORGER 79, in this engineer's opinion, occurred before the exercise started. It is simply this: war in Europe during the Winter will be far more difficult than at any other time of the year.

In the icy grip of a severe winter, it is a theater that favors the attacker. Ice in ports and on roads aggravates the already complicated mission of receiving reinforcements, equipping them, and moving them into combat. Equipment becomes balky, batteries die, ships cannot dock, mechanized vehicles slide off roads, and bitter cold add to "the fog of war." Laying of minefields becomes cumbersome in meter-deep snow and their effectiveness becomes doubtful unless special measures are taken. Ground fog is more prevalent than normal and takes longer to dissipate.

FTX Cetain Sentinel was an impressive preview of how the first few days of war in the dead of winter might go. In spite of the confusion, bitter cold, and treacherous roads, the combined arms team waged successful "war."

Mechanized emplacement of antitank mines during adverse weather requires prior planning

The important lessons derived from Certain Sentinel also chart us a course of actions to improve engineer support in the future. These lessons underscore and reinforce the lessons learned during REFORGERS 77 and 78.

LESSON 1

The battlefield will be lethal and the threat from enemy air and artillery is sizable. We need to provide our engineers with armored cover so that they can *survive* artillery and small arms fire.

LESSON 2

The *lack of mobility* is painfully obvious to anyone who has observed Corps engineers trying to keep up with the mechanized combined arms teams, or seen a brace of dozers scuttling from a work site toward their low-beds as enemy armor comes into sight. Mechanizing our Corps engineer battalions and adding the Universal Engineer Tractor (UET) to the inventory will provide badly-needed survivability and mobility capabilities.

LESSON 3

Communications equipment for command and control of our typically widespread engineer forces are woefully inadequate. We need systems that can cover distances of 60 to 80 kilometers, and which have the capability of monitoring three nets from a company commander's jeep. The alternative is a reorganization of engineers within a division Area of Operations (AO). Such an alternative would be very costly.

LESSON 4

Our *breaching equipment* is virtually nil. The active defense will require rapid breaching of enemy minefields. Our mechanized forces need rollers and plows. We need improved line charges such as the Viper.

LESSON 5

We need *winter camouflage items.* White coveralls, winter camouflage nets, and white panels, coverings, or winter camouflage patterns for equipment are necessary. If a company can be seen, it will be hit; if it is hit, it will be decimated. Our camouflaged equipment is painfully outstanding in winter woods and snowy settings.

LESSON 6

We need a different *engineer organization* to be more effective in the combined arms team. We need an engineer major to control engineer forces (typically two companies) supporting a maneuver brigade. Four different configurations were tried during Certain Sentinel in order to ascertain the best organization for the brigade engineer. It became obvious that the company commander cannot handle two companies of engineers and still be at the Brigade TOC when needed. An engineer major in the Brigade TOC proved to be the best solution. He should be the Brigade Engineer, commanding a beefed-up engineer company, with a captain as executive officer.

There were 7,000 engineers who participated in REFORGER 79—11 percent of the combined arms forces—and they weren't enough. About 2,000 engineers were committed to construction support, maneuver damage, and control of the exercise. There was a void of engineers from the Brigade rear boundary to the Corps rear boundary. Within a division AO, there were normally 2,000 engineers, or two battalion's worth.

There appears to be considerable merit to recognizing this requirement with an organizational solution. After three tours with combat engineers in V Corps and VII Corps, I'm convinced

that an engineer regiment in the division, with a mini-battalion supporting each brigade, is needed. It would merely recognize the configuration we practice every FTX. I'm also convinced that the current officer shortage and space crunch will never permit that size force in the division.

A compromise is clearly in order. The three companies that provide direct support to the three maneuver brigades of the division should be increased by two line platoons and be commanded by a major (brigade engineer). He should have a captain as executive officer to execute the brigade engineer's operations plan.

Other companies in the battalion, except the bridge company, could remain essentially unchanged. The bridge company should be replaced with a line company to give the division engineer some flexibility in supporting a fourth brigade or task force, as well as a cavalry squadron and/or the division rear.

LESSON 7

Logistics is still a problem. In Certain Sentinel, the barrier haul logistics were practices as well as I have ever seen. Nevertheless, the logistics requirements for minefields remains considerable. We need a small lethal antitank mine (such as in FASCAM) but conventionally fused. This would give us a four to one advantage over our bulky M15s. A conventional follow-on antitank mine will go a long way toward relieving our barrier logistical problems.

We also need the Ground Emplaced Minefield Scattering System (GEMSS) and the M180 rapid cratering system to speed obstacle emplacement in a short-fused, come-as-you-are war.

During Certain Sentinel, I witnessed the smoothest division-size river crossing operation imaginable. The 1st Armored Division put an Assistant Division Commander in charge of the operation and a Corps engineer battalion headquarters was provided to do the work. The division placed various staff personnel in the battalion headquarters and from a single room in a Gasthaus, the entire operation was conducted with the precision of a Swiss watch. More than 3,200 vehicles crossed without incident and with little congestion. In fact, there were no major problems.

The Medium Girder Bridge was used several times, occasionally with a Chinook as the prime mover. It proved to be a very flexible and efficient new system.

Although Europe in winter's icy clutch favors the attacker, there are two factors which favor the defender. First, the rivers freeze over just enough to impede assault crossings, but not nearly enough to form the base for an ice bridge. This enhances the obstacle value of defense along a river line.

Second, the severe cold doesn't last long, typically two to four weeks. Sudden thaws saturate previously frozen ground, making cross-country movement slow, and even impossible in some cases. When rivers swell, floating chunks of ice endanger bridging operations, a new factor which must be considered. The defender can integrate these factors into his plan and partially offset some of the disadvantages cited at the beginning of this article.

SUMMARY

The 7,000 combat engineers who supported the maneuver forces during Certain Sentinel acquitted themselves well. With typical engineer hustle, they worked day and night to help maneuver commanders structure the battlefield. They did it with dated equipment. With the exception of our bridging equipment, the tools with which our combat engineers worked belong to another era. We must modernize these tools if we want our combat engineers to keep pace with other members of the combined arms team.

Colonel Jerome B. Hilmes is the Commander of the 7th Engineer Brigade and is the VII Corps Engineer. The 7th Engineer Brigade provided engineer forces for both BLUE and ORANGE forces during REFORGER 79, and was responsible for maneuver damage, emergency repair, and construction.

ENGINEER

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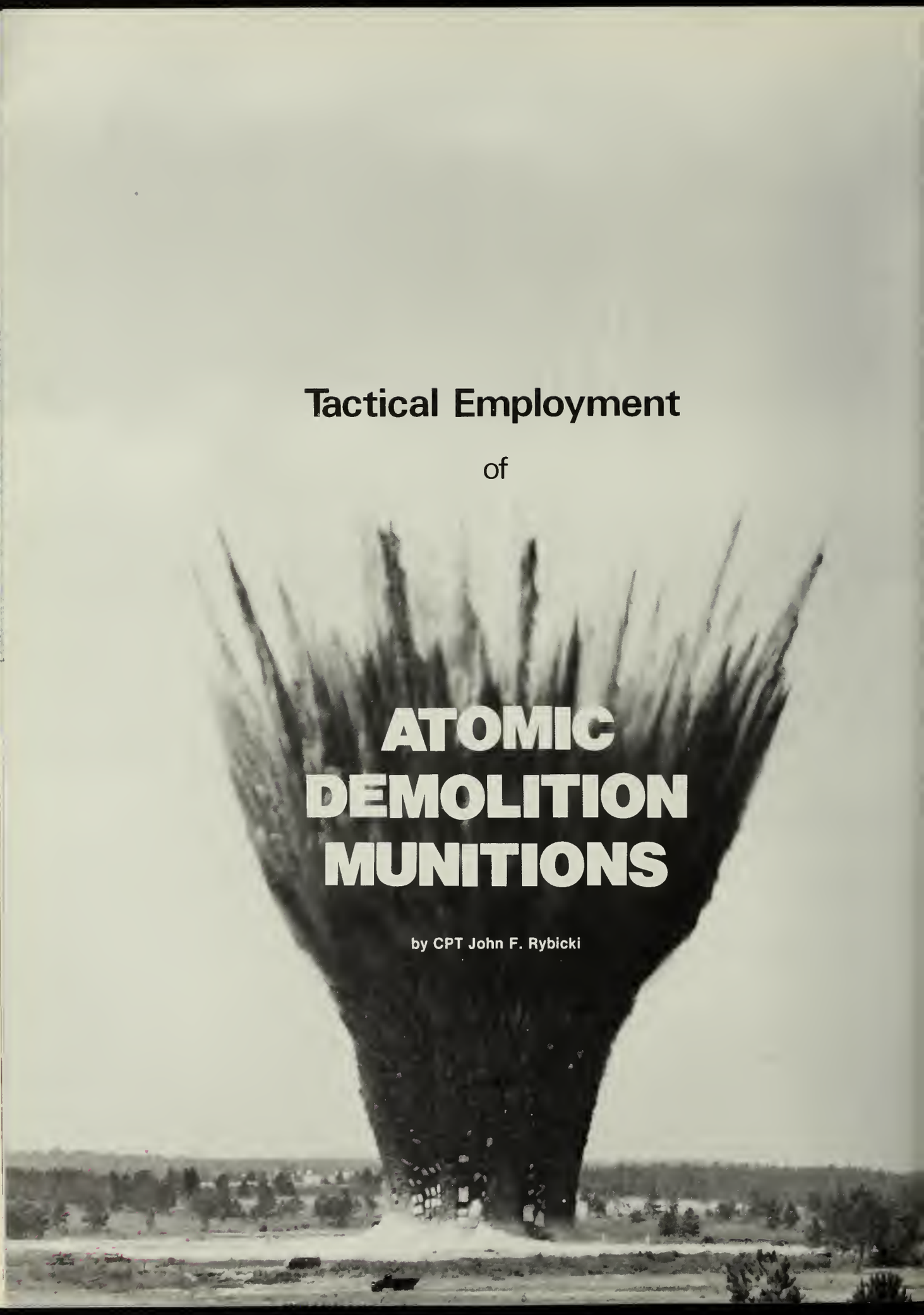
Tactical Employment

of

ATOMIC DEMOLITION MUNITIONS

by CPT John F. Rybicki



The purpose of this article is to rationalize the use of atomic demolition munitions (ADM) as an antipersonnel weapon without detracting from its current use as an engineer demolition. Points developed here are not intended to answer all questions involved in this concept, but are intended to stimulate thought and controversy. In response to specific questions posed during military appropriations hearings before Congress for Fiscal Year (FY) 1975, then Secretary of Defense James Schlesinger stated that theater tactical nuclear weapons will be employed:

". . . in response to an overwhelming Warsaw Pact conventional attack where the consequences of conventional defeat are deemed more serious than nuclear escalation. Theater nuclear forces would be employed in conjunction with conventional forces within clearly perceivable limits to halt the aggression through a dramatic reversal of the tactical situation."

These "clearly perceivable limits" are preplanned nuclear weapons packages consisting of specific weapons and yields for use in well-defined locations within exact time limits. ADM logically may be included in these packages.

The purpose of this package will be to neutralize large enemy formations in order to produce the "dramatic reversal of the tactical situation." I suggest that current nuclear weapons employment doctrine include the use of ADM as a weapon. The use of ADM against personnel would not be any more escaltory than would the use of nuclear artillery or nuclear air strikes. The use of ADM against personnel should not be considered revolutionary but as another option for an already operational tool in our efforts to win the "first battle."

ADM are planned for employment against material-type targets to destroy massive structures (that is, bridges, dams, road networks) and thereby reduce the enemy's maneuver ability by creating obstacles. The use of ADM closely parallels that of conventional explosives. The use of ADM, however, is exemplified by savings in time, manpower and logistical support and offers an increased demolition capability along with certain "bonus" effects that can enhance obstacle effectiveness and are potentially hazardous to troops.

These bonus effects include thermal radiation, which can significantly increase damage to targets by burning; initial and residual nuclear radiation, which can incapacitate troops and contaminate large areas of the battlefield; and tree blowdown, which can make by-passing any obstacle more difficult.

Each ADM in this hypothetical family has an "on-call" remote-firing capability that greatly increases the weapon's battlefield potential. This remote capability consists of either a wire-firing or radio-firing option for detonation upon command. This system is both lightweight and man-portable and can be emplaced either at ground level or below the surface, and its effects can be varied and controlled by selected burial depths.

Any attack from Eastern Europe into the West would bring with it numbers of men and equipment superior to the defending NATO forces. Extimates on present NATO versus Warsaw Pact force strengths are numerous and much debated. There are so many variables to consider that detailed analysis is not a simple task.

Some widely accepted figures are available for analysis, however. It presently is estimated by the Defense Department in its annual report to Congress (FY 1978) that Warsaw Pact forces would outnumber their NATO counterparts in medium tanks by about 4 to 1, in armored personnel carriers (APCs) by about 3 to 2 and in artillery by over 3 to 1.

Current production schedules of the United States and the Soviet Union are not narrowing this equipment gap. In fact, in FY 1977, the Soviet Union outproduced the United States in medium tanks by 6 to 1, in APCs by 3 to 1, and in artillery pieces by 8 to 1. In major ground force weapons systems, the United States has a substantial lead over the Soviet Union only in helicopters (3 to 2) and in tactical nuclear warheads (2 to 1).

Recently published NATO estimates suggest that, in local penetrations on a European battlefield, the Soviets may engage NATO defenders with as many as 600 tanks across a 5-kilometer front. That is roughly one enemy tank every 25 feet over a front of approximately 3 miles. Though the Soviets would not attack in an exact linear formation, the depth of the first echelon attacking force could be as little as 200 to 300 meters. This force would be followed by mechanized infantry and other tank formations to exploit the penetration and mop up by-passed NATO forces.

Such attacks undoubtedly would be made over high-speed avenues of approach simply because the terrain must be favorable to such a formidable force in order for it to maneuver. In southern West Germany where US forces are currently assigned, major avenues of approach for massive combined arms formations are limited and

easily recognizable. These high-speed avenues of approach are candidates for ADM employment to impede enemy movement by creating large craters or other massive obstacles which would make these approaches impassable to a highly mechanized force. These obstacles would slow the enemy's momentum and delay his formations in large killing zones that would be susceptible to either air or artillery-delivered nuclear or conventional counterattack.

Presently, a number of nuclear systems exist which have as their primary mission the destruction of enemy formations. All these systems, however, including guided and unguided rockets, tube-launched artillery rounds and air-delivered systems, have a delivery error which could detract from their overall effectiveness. Delivery error results in larger warheads being used to assure the desired coverage of a target element. Larger yields increase safety distances required for civilians and friendly forces and may result in undesirable collateral damage over much larger areas.

These systems are excellent for targets of opportunity which may appear on the battlefield unexpectedly. But, for high-speed avenues of approach, it is possible to preplan targets and "seed" an area with munitions in anticipation of an enemy attack without delivery error and without allocating valuable air and artillery assets.

Tactical air and artillery assets are high-priority targets and extremely vulnerable on the modern battlefield. Artillery systems are susceptible to hostile weapons locator systems that can detect incoming rounds automatically and direct immediate counterfire against those positions. This, coupled with the fact that NATO is outnumbered in artillery pieces by over 3 to 1, makes it imperative that artillery be used cautiously and selectively, especially the nuclear-capable weapons. Highly flexible nuclear artillery must be spared for actual enemy penetration threats or for local counterattacks and counterbattery fire.

Tactical air-delivered systems are also highly vulnerable. One need only study the devastating effect that the Soviet-supplied Egyptian air defense system had on the Israeli Air Force in the 1973 October War. The United States can no longer count on unchallenged air superiority over the battlefield. There will surely be a fight for control of the skies, and this fight will have a high priority in the early allocation of available aircraft. Aircraft simply will not be available for all close air support missions that tactical commanders may desire, and those that are available will face a lethal air defense envelope over the battlefield.

Conceivably, ADM can take up some of this battlefield "slack" where it is known that large mechanized forma-

ADM EFFECTS ON SPECIFIC TARGET ELEMENTS

(Hypothetical ADM Family)

TARGET ELEMENT	DAMAGE/INJURY	YIELD IN KILOTONS 0.2	1.0	2.0	5.0
Highway Truss Bridge	Moderate	90m	230m	340m	530m
	Severe	40m	200m	140m	210m
Tracked Vehicles—APCs	Moderate	70m	180m	260m	400m
	Severe	40m	110m	150m	210m
Tracked Vehicles—Tanks	Moderate	50m	130m	180m	260m
Wheeled Military Vehicles	Moderate	70m	180m	260m	400m
Casualties/Exposed Personnel	IP	230m	410m	560m	710m
	IT	310	520m	700m	890m
	LL	460m	710m	950m	1190m
Casualties/Personnel in APCs	IP	210m	390m	520m	670m
	IT	290m	490m	660m	830m
	LL	430m	680m	900m	1120m
Casualties/Personnel in Tanks	IP	160m	320m	440m	560m
	IT	240m	420m	560m	710m
	LL	370m	590m	790m	980m

NOTES: Moderate Damage—major repairs needed to return item to service
Severe Damage—total reconstruction necessary before item can be repaired and utilized
IP—immediate permanent incapacitation; personnel will become incapacitated within five minutes; death will occur in one to two days.
IT—immediate transient incapacitation; personnel become incapacitated within five minutes and remain so 30 to 45 minutes; personnel will partially recover, but death will occur within four to six days.
LL—personnel become functionally impaired within two hours, but may respond to medical assistance before death in several weeks.

tions must advance, such as mountain passes and defiles and across major bridges and autobahns.

As an example, consider an enemy attack across a 3-kilometer front down a high-speed avenue of approach with mechanized infantry and armored forces. If an ADM were emplaced on the surface and a remote firing option were used, a commander could have the munition detonated as the enemy approached.

A single 2-kiloton (KT) weapon would damage enemy tanks 180 meters in all directions and APCs out to 260 meters. This could neutralize 12 percent of the attacking armor and 17 percent of the APCs in a single blast. Personnel in those tanks would be susceptible to initial nuclear radiation and would become immediate casualties out to 560 meters (37 percent of all tanks crews). Personnel in APCs would become immediate casualties out to 660 meters or 44 percent of all mounted mechanized infantry. These crews would become casualties from an initial radiation dose within minutes of the detonation and eventually succumb to this exposure.

Delayed casualties resulting from this nuclear blast could reach approximately 70 percent of the entire force. Again, these casualties would result from a massive dose of initial nuclear radiation, would become incapacitated within hours and eventually would die. Chaos and confusion would be added as bonus effects for the defenders and would likely present good targets to modern antitank systems.

Besides these effects to men and equipment, a crater approximately 30 meters in diameter and 13 meters deep would be formed at the point of detonation, and dry fuels would be ignited over a total area of 10.2 square kilometers. Troops in the open would receive second-degree skin burns up to 530 meters from ground zero. Fallout, induced ground radiation and fires could enhance the effectiveness of the obstacle.

Even greater effects could be obtained if the system were emplaced and detonated above the ground such as in an abandoned building. Not only would blast and thermal damage be enhanced, but residual radiation would be reduced, allowing friendly troops to operate in the affected areas sooner.

There are other points to consider. If an ADM is to be detonated when an enemy axis of attack is in the best position for destruction, the executing commander must know exactly when to give the order to fire. This means that he will have to "sense" the enemy either by means of a forward observer, the ADM assembly team itself or by some electronic surveillance equipment. If personnel are to be used as the eyes of the commander in observing the enemy, a minimum safe distance must be observed for each yield so that no danger from the detonation occurs. This distance can vary from 610 meters for a .2-KT weapon detonation on the surface to 2,320 meters for a 5-KT weapon with the observer in a protected position.

Since maximum destructive force would be delivered to the enemy when the weapon was as near the center of the enemy force as possible, it may be best to have the enemy reconnaissance and advance guard elements pass by the weapon in order to cause maximum damage to the main body. It also may be desired to use conventional obstacles such as mines and ditches to slow the main enemy force or to bring the main body under antitank guided missile fire to stop it or reduce speed as it approached the best position for destruction. After the detonation, reconnaissance and advance guard elements, now cut off from the destroyed main body, can be attacked and eliminated.

Such a weapon would have to be well-camouflaged and possibly moved off of the center of advance to lessen the possibility of detection. If the weapon is placed well before the arrival of the enemy, camouflage should be no problem. Our hypothetical 2-KT ADM is 5 feet long and only 2½ feet in diameter with an approximate weight of 500 pounds. Other systems in this family can be as small as 3 feet long and only 15 inches in diameter with a weight of only 100 pounds. Camouflaging an object this size should not be a major undertaking.

Where terrain demands, the system can be buried and, as the depth of burial is increased, the radius of damage decreases. As a rule of thumb, the radius of damage is reduced by 10 meters for every meter that the system is buried down to a depth of approximately 10 meters. If the system is to be buried and used as an antipersonnel-type weapon, a depth of burial in excess of 10 meters would not be practical.

Since the damage radii can be controlled by the depth of burial, the commander is given an even greater flexibility in his planning. With only a limited number of yields available, significant modifications in damage radii can still be achieved by varying the depths of burial. This modifying ability can be used to reduce collateral damage and also reduce safety distances for friendly troops operating in the area. Preplanned targets with predetermined yeilds using ADMs and a minimum of trained personnel can increase the commander's battlefield flexibility greatly.

With our own small numbers of deployed forces, every concept that could economize forces and maximize firepower effectiveness at the front must be considered. The ADM is a reliable and available system that could be used now as a weapon without modification to the system itself. Only a change in doctrine, thinking and training would be needed to make the ADM a more potent tool and take full advantage of its total capability by enlarging its battlefield role from simply demolition to weapon.

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Dozer operators sharpen their skills at antitank ditching during ARTEP

the COMBAT HEAVY battalion in FORWARD support

by MAJ Francis R. Skidmore and MAJ John R. Mullans

The 94th Engineer Combat Battalion (Heavy) in the three years following conversion has found the concept of forward combat support to be a viable one, although not the only one for a heavy battalion. Combat heavy engineers can contribute effectively in their traditional rear area construction role and also in combat support of forward maneuver forces. But the combat heavy battalion has unique strengths and weaknesses, which must be carefully considered before it is deployed forward.

To understand the role of the combat heavy battalion, it is necessary to understand the corps engineer force structure in Europe. The active engineer force structure today is based on three engineer battalion organizations: the divisional battalion, the corps combat battalion, and the combat heavy battalion, supported by other specialized engineer units.

Winning the first battle of the next war in Europe requires that every component of the combined arms team be employed to maximize the combat power of our maneuver forces. In recognition of this, construction battalions in Europe converted to combat heavy in 1975 and 1976. At that time, questions arose as to the effectiveness of such units in forward support.

Current Army doctrine dictates that most combat enginer assets immediately available to the corps commander be committed well forward in the brigade areas (Fig. 1). Divisional engineer battalions have the mobility to remain with the maneuver forces and the protection to survive in a high-intensity environment. Their missions center on emplacement and removal of obstacles and providing protection to the division's fighting forces.

Corps combat battalions increase the corps' combat effectiveness by providing engineer combat support and general engineer work and by reinforcing divisional engineer units. To achieve the mobility to match their missions, the corps combat engineer battalions in Europe will someday adopt the armored personnel carrier as the squad vehicle, replacing the current 5-ton dump truck. This change will allow corps engineers to operate more effectively with forward maneuver forces but will, of course, reduce their capability for general engineer support work.

This engineer force structure is a compromise between the numerous general engineer support requirements and the fiscal and manpower constraints placed on the engineer slice of the total force structure. There are many more potential engineer requirements than forces to accomplish them. With lighter, more mobile combat engineers positioned forward, the engineer combat battalion (heavy) provides an engineer capability for the remaining engineer requirements in both forward and rear areas.

The Engineer Combat Battalion (Heavy) is organized and equipped by the Table of Organization and Equipment (TOE 5-115, modified by MTOE) to perform three basic types of missions:

1. Construction of roads, airfields, pipelines, etc;
2. Combat support and general engineer work;
3. Infantry operations;

The battalion is structured with a headquarters company, an equipment support company, and three line companies. Line companies have the bulk of the line strength with two general construction platoons and one heavy equipment platoon each. The support company adds another equipment platoon and a direct support maintenance platoon. Total equipment and construction personnel capabilities are listed in Tables 1 and 2.

Construction is the traditional mission of the construction battalion, the predecessor of the current combat heavy battalion. The construction mission is still appropriate in forward areas and is now properly termed combat construction. The range and lethality of modern artillery and air delivered weapons enables the enemy to destroy vital main supply routes, forward supply systems and distribution centers over an extremely large area. The density and location of towns and urban areas on all major routes present choke points easily blocked with debris and rubble created by long range weapons.

Enemy air and artillery emplaced mine systems represent other potential obstacles which may disrupt the logistical supply system. Forward deployment of a combat heavy battalion to overcome such obstacles is an excellent utilization of its assets and perhaps the essential salvation for a combat engineer force that has sacrificed some general engineer capability for mobility.

In combat, the six construction platoons become basic combat engineer platoons, with pioneer tools and dump trucks for equipment. The battalion's heavy earthmoving equipment from its four equipment platoons provides the greatest advantage to the maneuver forces. In particular, the active defense offers an excellent opportunity for employment of the equipment.

Working behind a covering force preparing the main battle area, the equipment emplaces tank ditches to channelize the attacking enemy armor and to render it more vulnerable to infantry, armor, artillery and air-delivered anti-armor systems. Of equal importance is the protection provided defensive forces by the construction of strong points and defilade fighting positions.

In the offense, however, this equipment is extremely limited. Neither the 10-ton tractor/25-ton trailer combination nor the 290M rubber tire tractor/scraper have the mobility to keep up with advancing or penetrating armored forces.

TABLE 1
MAJOR EQUIPMENT ASSETS ENGINEER COMBAT BATTALION (HEAVY)

D7 Dozers	13
Front End Loaders	9
290 Tractor w/18 Cy Scraper	9
290 Tractors w/o Scrapers	6
Graders	9
25 Ton Cranes	5
Backhoes	3
10 Ton Tractor/25 Ton Trailer	21
5 Ton Dump Truck	32
20 Ton Dump Trucks	8
Rollers, All Types	6
Water Purification Units	2

TABLE 2
CONSTRUCTION MANPOWER ASSETS ENGINEER COMBAT BATTALION (HEAVY)

Construction Helper	6
Carpenter	72
Construction Foreman	35
Heating & Ventilation Specialist	6
Plumber	18
Water Supply Specialist	6
Electrician	36
Engineer Equipment Mechanic	39
Asphalt Specialist	2
Dozer Operator	13
Crane Operator	9
General Machine Operator	34
Grader Operator	15
Wheeled Tractor Operator	15
Front Loader Operator	11
Construction Machine Supervisor	16
Truck Driver	84
Construction Surveyor	6
Construction Draftsman	6
Combat Engineer	1
TOTAL	430

An additional strength of the combat heavy battalion is its equipment maintenance capability, which allows the battalion to deploy an independent, self-contained force. Direct support mechanics can operate forward as contact teams, while shop facilities provide back-up support from field locations. This greatly increases the operational value of the heavy equipment.

In addition to limited mobility, the 94th Engineer Battalion has found that inadequate communications equipment is a major constraint to proper command and control in combat engineer operations. Thus, specific mission assignments in the forward battle area provide a better utilization of battalion assets than direct support or attachment of combat forces, which depend on mobility and good communications.

Execution of the infantry mission must be considered an extreme choice taken only under drastic emergency conditions. It provides the maneuver commander with a light infantry force weak in communications and crew served weapons. It also deprives him of the engineer support he needs to enhance the combat power of his maneuver forces.

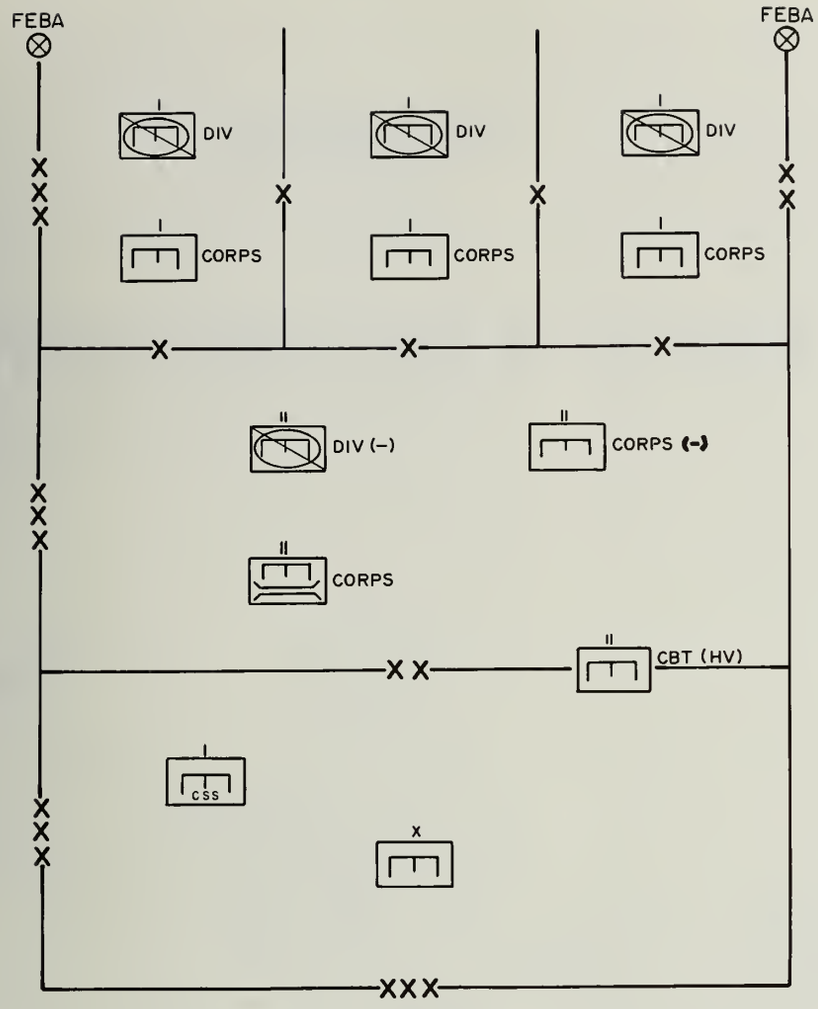
The training program for combat heavy battalions in Europe reflects the trade-offs between a real peacetime construction mission and the wartime readiness requirement. It is possible, however, to achieve a high state of training readiness for forward deployment under these conditions.

Training in 18th Engineer Brigade heavy battalions is scheduled to allocate 75 percent of training time to construction projects and 25 percent of the time to combat and combat support training (Figure 2). Construction projects tend to be platoon-sized in scope and provide excellent opportunities for development of vertical and horizontal construction skills. Thus, a proper selection of projects insures that soldiers are well prepared for traditional rear area missions in the event of war.

Training for forward deployment, which is oriented on combat engineer or combat tasks, is more of a challenge for a construction-oriented battalion, but it can be accomplished. The approach of the 94th Engineer Battalion in this regard is typical of other combat heavy battalions in the 18th Brigade. First and foremost, the construction program itself has proved to have applicability to forward area missions. The challenge of managing actual construction projects provides excellent leadership training for officers and NCOs. Managing men, materials, and transportation against time deadlines, or researching engineering manuals to solve problems, are processes common to all engineering situations.

In addition, equipment platoons, which comprise 40 percent of the battalion's line platoon strength, receive excellent training in actual construction projects as operators become skilled on their equipment. Equipment "stick time" is the single most important element for insuring a professional response to tank ditch, hull defilade, or maneuver support missions in the forward area.

It is recognized, however, that additional training is required to supplement training derived from the construction program. Consequently, 25 percent of all training is combat engineer oriented and conducted to minimize forward deployment limitations of the heavy engineer battalion. Particularly useful are training exercises which stress forward deployment. For example, two



THE CORPS ENGINEER FORCE STRUCTURE

FIGURE 1

of the brigade's combat heavy battalions (the 94th and 79th) participated in recent REFORGER combined arms exercises and learned important lessons on how to work and communicate with the combat units. Going further back, in 1976 and 1977, the 94th conducted extensive testing on tank ditching techniques which contributed to doctrine on dimensions and construction methods. With continued emphasis on these missions during company ARTEPs, equipment platoons maintain a high state of readiness for forward deployment.

No-notice readiness tests, company ARTEPs, and basic weapons qualification constitute the remaining 25 percent of scheduled combat engineer training. Scheduled properly, this training assures that all units in engineer combat heavy battalions are reasonably proficient in their forward area combat support missions.

Skill Qualification Testing is adding a new dimension to the training program. As Soldiers Manuals and various test components for engineer and support MOSs are incorporated into the program, additional training time and management effort will be allocated for the testing procedures.

In summary, the combat heavy engineer battalion should not be a substitute for an additional corps combat battalion in the forward area. Its mobility, weapons, and communications are not adequate in a mechanized environment. With current peace-time constraints, the combat heavy battalion operates infrequently with combined arms units.

Properly utilized on a mission or area basis, however, it can significantly multiply forward combat power of maneuver forces in a defensive situation which requires combat construction, tank ditching, strong point construction, and defilade protection for both tactical and support vehicles and facilities. In Europe today, the engineer combat heavy battalion has proved itself effective in combat support as well as combat construction, and will be ready for forward deployment during a conflict.

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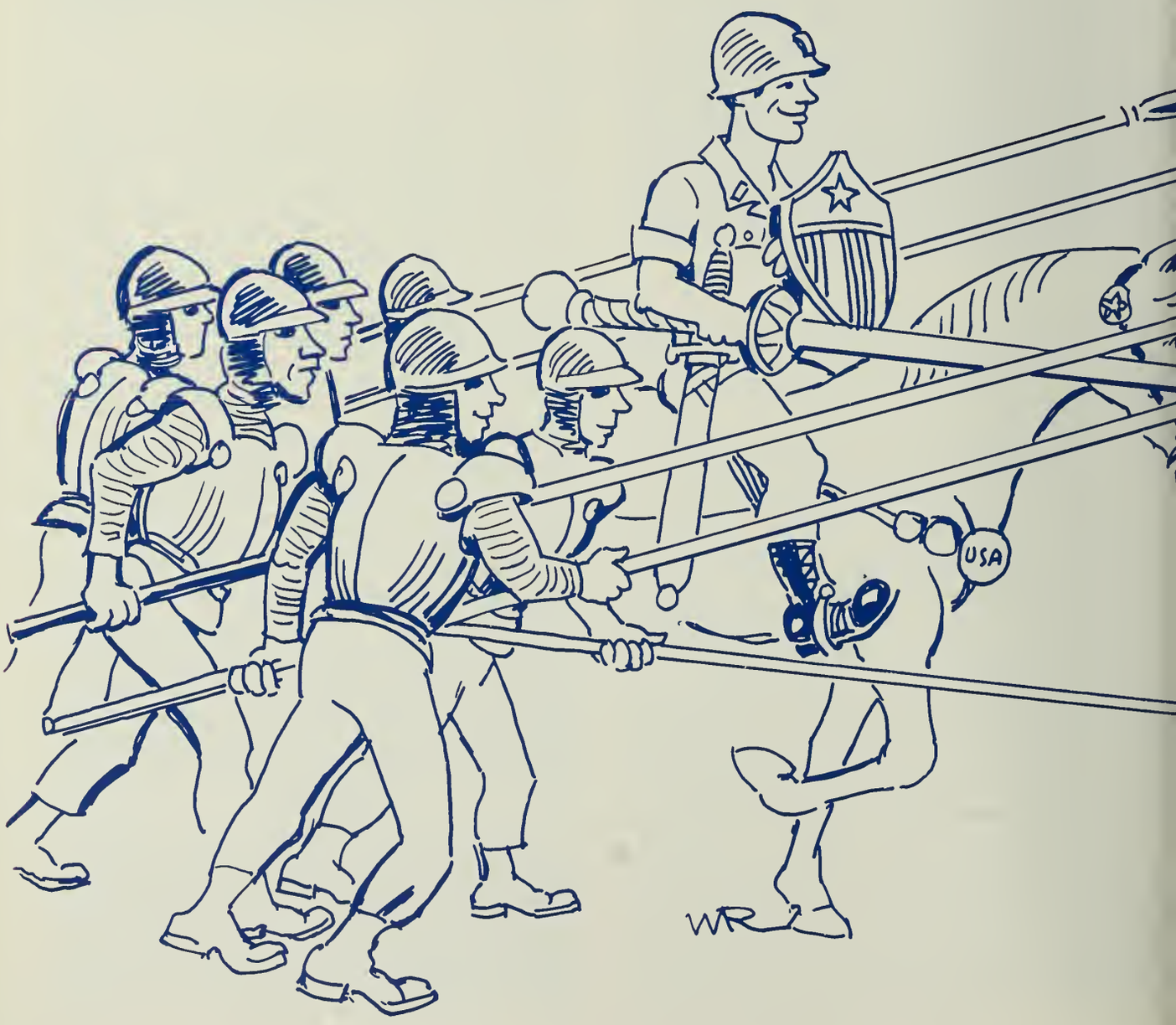
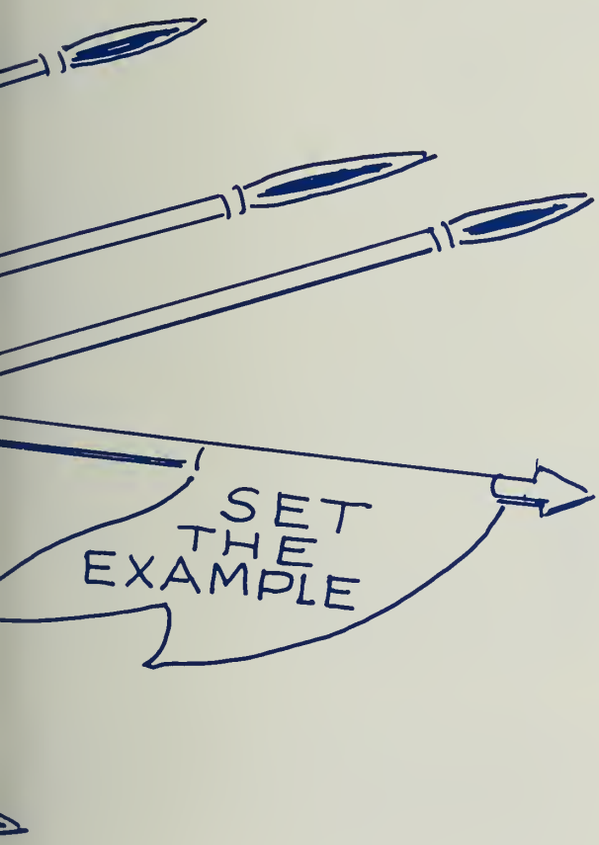
Guidelines for

New Lieutenants

by CPT James B. Norwood



Leadership is an individual thing. No one ever became a leader by memorizing endless "laundry lists" of leadership techniques and applying them scientifically to his relations with his subordinates. Rather, the successful leader uses those time-honored leadership principles like the artist's paint. A dozen artists may use the same paint to portray the same scene, but the brush strokes of each one will be different, as will the use of color and hue. So it is with leaders: each one must develop his own style, applying the principles he has learned with his own brush strokes and coloring them with his personal strengths and talents.



As a new lieutenant, you are faced with the challenging task of developing your own leadership style in a world peopled with men and women who have more experience than you, but who depend on you daily for leadership and guidance. Here are some notes, taken from my own experience, to help you weather the storm until that moment when you know what you want your painting to look like.

One of the first things you will notice that you lack is experience. In the Army, experience is everything. Quite often, the man with experience is in charge whether anyone intended for him to be or not. Soldiers respond to the man who knows how to get the job done. No one expects you to arrive with experience. They will expect you to gather it quickly. You must learn from everything that you do and you must do as much as possible to gain experience. Do not be content to ride along letting others do all the work. One of the most dangerous things you can do is to pretend that you know what you're doing when you really don't. No one resents a beginner as much as he does the guy who pretends to know it all when he doesn't.

The first corollary to gaining experience is asking questions. You must ask questions to learn. People expect you to ask a lot of questions. It shows that you want to learn how to lead them effectively and it shows that you are interested in them and in their work. Never be afraid to ask questions. More about questions later.

Be a leader, not a laborer. It's easy to get lost in the fun of doing manual labor. You have entered an interesting profession and there are a lot of tasks that can be fulfilling in themselves. Your job, though, is to lead and manage. You will have many things going on at one time and you must be aware of all of them continuously. As soon as you get personally involved in one task, you lose control of all the others. Let the soldiers do the work and the NCOs supervise and teach: that's their job. You make sure that all of them are doing their jobs and that your entire communications complex is being erected efficiently and according to plan.

Keep abreast of changes. In garrison or in the field things are changing all of the time. There's an old saying that "change is normal." It is! You are the link between your soldiers and your commander, your unit operations section, a battalion systems control center (SYSCON), and any other outside source of information. When something changes, your people depend on you to know and to tell them. Know who makes changes that affect your platoon or its mission. Maintain contact with them and probe frequently to find out what's going on.

In addition to being a link between the commander and the soldier, you are a buffer between

them. You buffer information passing both up and down the chain of command. This does not mean that you misrepresent facts or fail to pass on essential information or orders. It does mean that you do not repeat everything you hear verbatim. Think about how you can best present information or orders to convey the appropriate message. Consider personalities, prejudices, and levels of experience before speaking. You must develop an appropriate threshold of response to the things you hear. If you overreact, you will lose credibility like the little boy who cried "wolf!" If you underreact, then people will believe they are not getting the whole story when you speak.

Find people's strengths and use them. I regard this as one of my most important personal techniques. It doesn't mean that you don't train people to overcome their weak areas—that is an essential part of your job. It does mean that when things get hot and you need a maximum effort from every soldier, you should know what you can expect from every soldier. At times like that it makes no sense to have your best field wireman run power cable while a relatively inexperienced man who is a whiz with the SB-86 switchboard tries to untangle the maze of wires leading to the brigade command post. That switchboard man will have his moment of glory later when the wires are in. Let him run the power line while the wire whiz gets those vital circuits hooked up. Every soldier feels good when he does something that he knows he does well. When he knows he's doing poorly, he becomes confused, resentful and slow. Good training will eliminate most of the problem but some guys will always be better at certain tasks. Know who does what well.

It is a fundamental law of human nature that people will do what you expect of them. If you expect them to do well, they will almost invariably fall over themselves trying to meet your expectations. Expect proficiency. Expect efficiency. Let your people know that you expect these things and reward them when they produce exemplary results.

Be concerned! Your level of concern reflects in everything you and your troops do. If you are indifferent, they will be, too. You cannot expect anyone to do a good job just to satisfy himself: if you have better things to do, so does he. One of my commanders put it very succinctly when he cautioned me to simply "Give a damn!"

Always follow up. Never expect that something will be done just because you told someone to do it. Check, check and recheck! After a while you will develop a reputation among your men for checking up and things will get done. Don't become complacent! As soon as your troops realize you have stopped checking, they will stop doing.

Ask questions. I said before that this would come up again. It will come up again after this! I cannot overemphasize the importance of asking questions. Questions unnerve the unprepared. When you start questioning the man who is doing a job poorly or incorrectly, he will become nervous. He doesn't really know if your are ignorant and curious or if you know all the correct answers and are merely testing him. Quite often he will blurt out the information that he is doing the job wrong or taking unauthorized short cuts. On the other hand, the man who is doing the job well will welcome your questions because they give him a chance to show off his knowledge and skill. Once he's told you how good he is, he's committed to a program of excellence.

In the field, the mission is always first. there is a lot of debate about whether the mission or the men come first, but the argument is fatuous. Troop welfare during the first 36 hours of a field problem is a matter of prior planning. If you have to become concerned with problems like food, clothing shelter, latrine preparation or related affairs during those first hours, then you did not plan properly. You must check to insure that the plans and arrangements you made are carried out on time and properly; but, if you have to stop the execution of the mission to get someone fed or to take care of some other morale or welfare related problem, then you blew it before you ever left the motor pool. During the entire field exercise you must plan for your troops' welfare in advance so that you do not become involved in crisis management. In performing your mission, crisis management cannot be avoided; in troop welfare matters, it usually can be.

Never criticize a fellow officer. It degrades the officer corps as a whole and it makes you look stupid because you have no more regard for your own profession than to degrade it.

Be open to advice. One of the things that distinguishes man as an intelligent animal is that he learns from the mistakes of others. Your peers may offer you advice based on their mistakes. Learn to recognize and use the good parts of their advice, your superiors may have a lot of advice based on their mistakes. I personally have a great deal of very sound advice based on a dazzling array of my own mistakes. Much of that is in these notes.

Trust your company commander. He has a vested interest in your success. After all, the better you do at your job, the better he looks to his commander.

You must support your commander. Never criticize him or his orders. You do not have to agree with him or take credit personally for an order that appears to be stupid, but you must never express your dissatisfaction openly to the troops. Simply make it plain that this is what the platoon has been directed to do and that you intend to see it done well.

Learn when to sit down and shut up. Any good commander will encourage discussion of his directives if you have something meaningful to contribute. Disagreement, if expressed in private, will seldom cause anger. Once the commander has heard all the facts and has made a decision, however, it is time to stop bickering and get on with it. Some commanders will permit their policies to be challenged in public; others will not. Learn which type you've got before opening your mouth.

Honest mistakes will be forgiven. Everyone expects lieutenants to make mistakes. Never make the same mistake twice! The first time is ignorance, the second marks you as an incompetent, or as a slow learner. Nobody wants either of those!

Take care of the troops. Make sure they have proper food and clothing and they get enough sleep. Make sure they get paid on time. These concerns are easy to manage in garrison but they can be a real headache in the field. Be aware of their problem, both individually and as a group. Soldiers' problems are not always like your problems. Maturity and a college background make a big difference in how we deal with problems. Sometimes, when you think you are receiving shoddy treatment from an agency or facility, you will find that you are actually receiving preferential treatment because you are an officer. You should see what the troops go through! Part of your job is to help your soldiers solve their problems.

Counsel continuously. You cannot expect a man to turn out the quality of work you desire if you never tell him how far he is from the mark or how close to it. Take every opportunity to tell your people how they are doing. Don't be afraid to tell a man he's doing poorly. How can he improve if he doesn't know he needs to? This is especially important if you are going to have to prepare an efficiency report on him.

Be fair. Never pick or play favorites even if someone seems to deserve special treatment. The platoon leader's "favorite" quickly becomes an outcast and is distrusted by his peers. This destroys the team spirit necessary to get things done. The platoon leader's credibility is destroyed in the eyes of those who do not see anything special about his "favorite." Never characterize yourself as a "good guy" or a "bad guy." Good guys are taken advantage of. Bad guys alienate everyone. Just be fair.

Be consistent. Never leave anyone in doubt as to where you stand. I have never met a soldier who didn't prefer having a boss he didn't agree with, but whose views and policies he clearly understood, to having a boss who is wishy-washy or can't make up his mind. Something that's good today should

be good tomorrow. What was unacceptable yesterday should be unacceptable a week from now.

Treat everyone with respect. Most people deserve it. The few who don't should receive it anyway, if only because it is your policy to respect everyone. When you become known as a man who respects others, your troops will begin to respect you whether they want to or not. We all value the esteem of others and tend to return it in kind. A corollary to this is that you should deliver criticism in private and praise in public. Criticism is much more likely to be constructive if there is no one present to overhear and cause the recipient embarrassment. Praise goes a lot further when you deliver it in front of a man's peers.

If the top NCO doesn't want to get involved, make him. If he just will not get involved, then take care of the problem yourself and counsel with your unit first sergeant on straightening him out. You must support the NCO chain of command! If the NCOs do not have faith in their own chain of command and in your willingness to support it, then they will not contribute to running the platoon and you will be on your own. In any confrontation between an NCO and an enlisted man you must support the NCO. You may have to get with your platoon sergeant later and have him counsel the NCO for being an idiot in his handling of the soldier, but never cause the man the embarrassment of being counseled in front of a subordinate. I have seen many cases where it was necessary to intervene to

Guidelines

Treat everyone with respect

Always support your commander

Learn when to sit down and shut up

Be open to advice

Take care of the troops

Be fair and consistent

Ask questions

Always set the example

Be concerned

Don't believe everything you hear

Never criticize a fellow officer

Always support your NCOs

You must always set the example. It might be more accurate to say that you are always setting the example, whether you intend to or not, so set a good one. The choice in setting the example is not yours. You are their leader and the troops tend to imitate you. If you take short cuts, so will your men. If you fail to take a job seriously, so will they. If you expect special treatment or privileges, they will, too. You can never expect anyone in your platoon, regardless of age or experience, to behave better than the example you set. Your actions, not your words, set the standards.

Always support your noncommissioned officers. Do not ever criticize or degrade one in front of his peers or his subordinates. Conflicts between peers are inevitable. It is the platoon sergeant's job to straighten these out. If the problem is brought directly to you, grab your platoon sergeant and get him on it. Don't deal with it directly yourself unless your platoon sergeant is unavailable within the time frame in which the problem must be resolved.

stop an injustice in progress, but it has always been possible to do it without embarrassing the NCO or correcting him on the spot.

Utilize available experience. In other words, listen to your experienced sergeants. Solicit their advice and opinions. You must make the final decision, but you need not make it in ignorance. Sometimes it pays to listen to your soldiers, too. Occasionally you will be surprised by what they know.

Here's my favorite technique again: ask questions! Questions show that you care. Ask about families, about finances, about the chow in the mess hall. Ask about job satisfaction and about ideas to improve things. Don't be nosey about personal details, but let your men know that their well being matters to you. Ask your squad and section sergeants about their men. They should know a lot about each of their people and their problems. When you ask them about these things, they will be prompted to find out.

Life is full of traps for the unwary. If you have given any thought to the complexity of your mission as a tactical Signal platoon leader, you have figured out that there must be a hundred gremlins out there waiting to trip you up. Here are a few of the more common ones to be prepared for.

Don't let yourself become confused. One of the unique (and fun!) aspects of the Signal Corps is that it is not uncommon for 25 or 30 things to be going on at once. This is especially true when a Signal center is setting up to go into operation. Your job is to bring everything together at once, but you can't do it if you're confused. Fortunately, it's simple to avoid confusion. Plan carefully, organize in advance and ask questions!

Never fear appearing to be stupid because you ask questions. If you are ignorant, the troops will find out whether you ask questions or not. You look a lot smarter when you are trying to find out what is going on than you do when you foul the job up because you didn't know something. There are, however, a couple of cautions involving questions. Unless the person you are asking is known to be absolutely trustworthy, always check out his answer before acting on it. This is especially true when the answer indicates that a third party is not doing his job properly. Many a lieutenant has embarrased himself by asking a sergeant why he didn't allow a man sufficient time to eat lunch, only to find that the man spent half of his lunch hour at the PX looking at phonograph records. Also beware of advice from your lower ranking people. Much of it will be good, but some may lead you to take dangerous or destructive short cuts.

Don't believe everything you hear. Many things are said purely for your "benefit." Some things are flat wrong. Always check out what you hear or overhear before acting.

Be aware that problems can be hidden from you. No matter how close your relationship with your NCOs may appear to be, no matter how much trust seems to be exchanged between you and your platton sergeant, you will always be an officer. You cannot become "one of the guys." There will always be something you do not know. Don't be surprised or shaken when something crops up—especially some kind of personal problem of one of your NCOs—just be continuously prepared to deal with the unexpected. It is seldom that a mission related problem will be hidden from you. Most of the time, when the hidden problem pops out, you will need to exercise compassion to deal with it. Occasionally you will become aware of things that you really don't need to know about. Some things are purely NCO matters. You have to learn to distinguish the problem that needs investigating from the one that is better left to other hands.

One of the most destructive pitfalls that befalls young lieutenants is the fear of counseling older NCOs. Most lieutenants feel awkward counseling a man with ten times more experience than they have. You have to avoid that trap. Older men make mistakes in spite of their experience. Sometimes a man's experience acts against him because he learned something wrong and has been doing it wrong for years. Age and experience do not make a man right. You should document your counseling sessions. I once had to fire a platoon sergeant who just couldn't get it together. I managed to get rid of him before he damaged the platoon too badly, but only because of extensive counseling with copious documentation.

Don't fall into the "you think you're good" trap. When you make decisions which affect a soldier adversely, particularly when you recommend action by the company commander under Article 15, the soldier is liable to attack you emotionally. He may accuse you of "playing God" by judging him for his wrongdoing. He may point out that you haven't been perfect all of your life, either, and you have no business being so hard on him. Quite often he will succeed in making you feel badly. Making such judgments is, however, part of your job. You must do it. Your superiors expect you to make value judgements and so do your subordinates. If you fail to do it, you will create disorder and chaos in your platoon. Don't let these incidents discourage you.

The troops know everything that you do. I mentioned before that you are going to set the example whether you want to or not. You are the most visible man in the platoon and you don't really have a private life. If you drink too much, the troops know. If you do dope, they know. If your personal life is a mess, it can't be hidden from them. If you are dishonest or unethical, it will be common knowledge. You must be clean if you intend to have the respect of your men.

After reading these notes you have probably noticed that there is nothing here to tell you what actions to take in accomplishing your job or mission. Those things are found in your unit SOP and often vary from one unit to the next. The issue here has been leadership: how you get your people to do what it is that you want them to do. If you are a successful leader, your unit will always accomplish its mission, because the men will not let themselves fail. The most important thing that you will do as a new lieutenant is to develop leadership in yourself.

Set the example.
Be concerned.
Ask questions!

Captain James B. Norwood is currently an operations/training officer in the 1st Aviation Brigade at Fort Rucker, AL. This article first appeared in the Spring 1979 issue of THE ARMY COMMUNICATOR.

Interservice Cooperation

Pays Off at Taegu

by LT Michael Hullihan

The Taegu Modulux Dormitory construction project was a prime example of interservice cooperative and merits examination in terms of advantages and lessons learned.

The $1.2 million housing project for Air Force personnel was considered a requirement upon the activation of a new fighter squadron at Taegu Air Base, Republic of Korea. Construction of this type of Air Force billeting facilities in overseas locations is normally the responsibility of Air Force Construction Engineering Squadrons, with contract construction by local nationals as an alternative.

But in the case of the Taegu Modulux Dormitory project, the distance from the project site to the nearest CE squadron, along with the prohibitive cost of civilian labor, led project planners to seek other means of construction.

By combining forces with Army engineers, an interservice construction team was formed. The two units involved were the Army's 802nd Engineer Battalion (C)(H) and the Air Force's 554th Construction Engineering Squadron. To better understand the significance of the cooperative effort, a familiarity with the missions and organizations of the two units is necessary.

The mission of the 802nd Engineer Battalion (C)(H) is self-sufficient horizontal and vertical construction. It has high equipment density and a high diversification of skills in operational units. Each general construction platoon, for example, is comprised of a wide variety of skilled personnel, tools, equipment and vehicles. A 40-man unit can move into a remote area, construct-battle environment structures, provide security for the work site, perform combat engineering missions, and fight as infantry.

A noteworthy feature of the 802d is the Korean Augmentation to United States Army (KATUSA) program in which approximately half of the personnel of some Army units are Korean soldiers. KATUSA soldiers are integrated into all elements of an Army battalion and fall under the same chain of command as their U.S. counterparts.

While the 802d is well suited for operating in a combat environment, its capability to construct large scale permanent structures is limited. Personnel and equipment necessary for structural steel work, heating, air conditioning, and secondary power systems are not present.

The 554th Construction Engineering Squadron (CES) is organized as a deployable heavy repair and air base facility construction unit. Its vertical construction assets are managed according to individual skills. Thus, carpenters, electricians, masons, etc., work out of centralized shops. Since most squadron projects are in the base area, shops can supply specific skills required by a number of concurrent projects. Under normal circumstances, e.g. when the squadron is deployed as a unit, this system affords efficient use of personnel.

The location of the Taegu Modulux Dormitory project, however, dictated a system modification. Construction of the facility required the establishment of an "operating location" considerably removed from squadron headquarters. Personnel and equipment to be used at Taegu Air Base were detached from the headquarters to meet the requirements of the project.

Combining Army, Air Force and KATUSA soldiers into a construction team required an adjustment of operating procedures. The system which evolved was a crew-type breakdown of personnel. With the high number of diversified tasks to accomplish the mission, to maintain supervisory control over troops, and to raise the expertise level of individual soldiers.

Under the crew system, Army, Air Force and KATUSA soldiers were separated into specific skill construction teams. Each team was placed under the immediate control of the most knowledgeable soldier, regardless of rank. Included in each crew were personnel undergoing on-the-job training.

A number of unexpected benefits were derived from the use of the crew system. Development of working relationships between Army, Air Force, KATUSA personnel meant overcoming interservice, cultural and language differences. Air Force personnel were given the opportunity to work with Korean soldiers on a day-to-day basis. Army personnel became acquainted with the organization and operating procedures of Air Force units. Most important, new construction techniques were derived from a diverse pool of experience.

Interservice cooperation during the course of construction insured responsive equipment support. While the 802nd had the heavy equipment, pneumatic and gasoline operated tools, and some of the hand tools required, it was not authorized the type or amount of tools peculiar to modulux construction.

The 554th CES, on the other hand, had ready access to tools and equipment for specialized construction tasks. By combining assets, construction speed and quality were greatly enhanced. In some cases, both the 802d and 554th possessed comparable equipment (e.g. hydraulic and winch cranes). The option to choose between two different models of the same item of equipment gave project managers additional flexibility.

A major factor in any construction project is materiel procurement. During the Taegu project, this factor became critical. Due to siting complications, which delayed allocation of funds, much of the materiel required could not be requisitioned until the project start date. To avoid job stoppage for lack of materiel, alternate supply sources were necessary. Again, the ability to draw on both Air Force and Army assets proved beneficial to project completion. Lateral support for critical items, such as lumber and plumbing fixtures, was obtained through both Air Force and Army channels.

In some instances, construction materials were purchased from local sources. While formal negotiations were handled by the Korean Procurement Agency, KATUSA soldiers were instrumental in preliminary inquiries and coordination of delivery. A KATUSA mason, for example, ordered ready-mix concrete on a daily basis. Since he knew the specifications and intended placement configuration, he was able to accurately translate the directives of the site engineer to the local batch plant manager.

To summarize, the Taegu Modulux Dormitory project points out several advantages of interservice cooperation. Foremost among these are efficient use of equipment and manpower, quicker materiel procurement, and responsive equipment support.

The training value of joint U.S. Air Force/U.S. Army projects should also be considered. Interservice efforts are imminent in future conflict situations. Recognizing this fact and preparing military engineer units to work together increases readiness. Other projects of the magnitude of the Taegu Modulux Dormitory construction could be managed in a similar manner. Interservice cooperation is certain to improve the efficiency and training of Air Force and Army units alike.

Army and Air Force engineers combine efforts on Taegu dormitory project

First Lieutenant Michael F. Hullihan is currently attending graduate school at the University of Illinois. He was assigned as a platoon leader with the 802nd Engineer Battalion (C) (H) from December 1977 through June 1979.

Engineer Problem

SITUATION

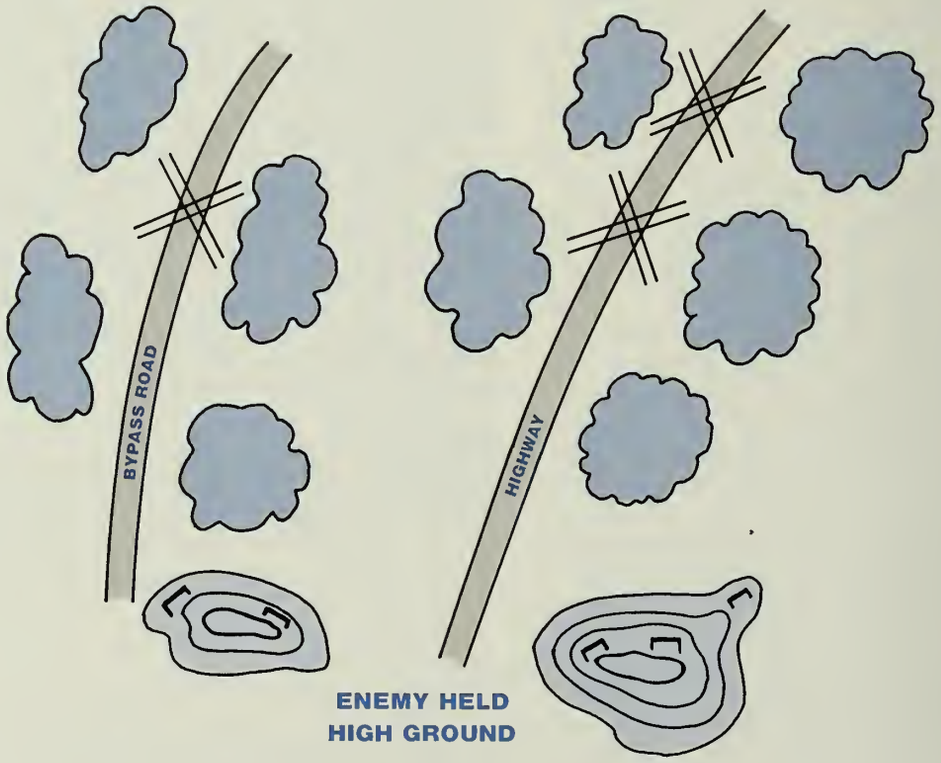
You are the commander of Company B, 59th Engineer Battalion (Combat) (Mech), in direct support of a mechanized infantry attack on a fortified enemy position toward the south. Your 3rd Platoon, in direct support of Task Force 1-6, has been assigned as avenue of approach along a two-lane highway through heavily wooded terrain. Your other platoons are heavily committed.

You receive a call from your 3rd Platoon Leader that lead elements of TF 1-6 have encountered two craters astride the highway. The first crater is approximately 16 meters across. An element of the TF has been dispatched on a road bypassing the craters to the west, but it has encountered a rectangular log crib and road mining.

Your Platoon Leader reports that the element attempting the bypass has squad vehicles and tools and that direct small arms fire on the crib has ceased. The task force commander wants both routes opened, with the highway route having top priority.

The battalion S-2 has provided you with the following intelligence: the weather will remain fair for the next 3-5 days; winds are generally north to south; inversion atmospheric conditions exist; and enemy artillery has a range of 30 kilometers with nuclear and chemical capabilities.

In addition to organic assets, the following resources are attached to the 3rd Platoon; an AVLB section organic to the Combat Support Company, 1-6 Armor; two each 5-ton dump trucks with pole trailers; and one Combat Engineer Vehicle (CEV). In addition to each squad's basic load of demolitions, the 3rd Platoon has three sets of M-157, 10 sets of bangalore, and 150 smoke pots.



PROBLEM

Your Platoon Leader says he can span the second crater with an AVLB, but he is not sure how to attack the first crater, especially since the enemy has long range direct fire covering the obstacle. He has considered filling the first crater, since adequate fill is available in a borrow pit 600 meters north, but he feels such an operation would take too long. He also asks you if he should send the CEV to the bypass road to assist in reducing the log crib.

See THE SCHOOL SOLUTION, page 40

Reserve Components

SPECIAL WEEKEND COURSES

Officers and NCOs responsible for training in their respective units are encouraged to attend one or more of the special weekend courses offered by the U.S. Army Engineer School at Fort Belvoir during the remainder of FY 80. Five weekend courses have been conducted since October 1, and eight more are scheduled between December 1 and April 13, 1980.

Selected students should be familiar with the subject matter since instruction is fast-paced and not designed for initial learning. Courses offered during the remainder of FY 80 are indicated below:

Detailed information on the program or questions regarding enrollment should be addressed: Commandant; US Army Engineer School; ATTN: Unit Training Section; Fort Belvoir, VA 22060. Telephone numbers for more information are: INWATS 800-336-3095, Ext. 3008; Commercial 703-664-3008; and AUTOVON 354-3008.

NEW TRAINING PROGRAM

Guard and Reserve enlisted personnel may now enroll in advanced ROTC courses and continue to serve in a Reserve Component unit, according to a recent Department of the Army announcement. In addition, ROTC advanced course cadets may enlist in Army National Guard or Army Reserve units as officer trainees. It is called the Army ROTC/Selected Reserve Simultaneous Membership Program (SMP) and requires Reserve Component (RC) enlisted status for eligibility.

SMP participants will drill with Reserve Component units as officer trainess. They will hold the rank of cadet and be paid for the enlisted grade and years of service reached. However, pay will not be less than that for grade E-5. Individuals will also receive ROTC training for which they will be paid a monthly subsistence allowance of $100 up to 20 months.

Upon completion of ROTC training, SMP participants will be commissioned and assigned to USAR or ARNG units until they graduate from college. At their request, they will then be considered for Regular Army appointments or three-year active duty tours, or they may be able to fulfill their obligation in Reserve Component units.

Enlisted RC members and ROTC cadets must meet the following criteria to qualify for participation in the program:

- Be a United States citizen;
- Be enrolled or intend to enroll in ROTC advanced courses;
- Have at least four years remaining on their enlistment when they enroll in SMP;
- Be less than 25 years old when accepted into the program;
- Have completed basic combat training, Military Science I and II, basic ROTC summer camp, junior ROTC, or one year at a service academy to qualify for entry into advanced ROTC;
- Be enrolled, or plan to enroll with at least two years remaining (or be an advanced ROTC cadet), in a full-time course of instruction leading to a Bachelor or advanced degree at a college or university hosting or having a cross-enrollment agreement with another school hosting Army ROTC programs.

Individuals on ROTC scholarships or participating in a federal tuition assistance program are not eligible to enroll in the SMP.

DATES OFFERED	COURSE NUMBER	COURSE TITLE
December 15-16	80 SP-6	Roads and Airfields in the Theater of Operations
December 15-16	80 SP-7	Engineers in River Crossings
February 2-3	80 SP-8	Fixed Bridging
February 2-3	80 SP-9	Engineers in River Crossings
March 1-2	80 SP-10	Mine/Countermine Hardware, Doctrine, and Operations at Battalion Level
March 1-2	80 SP-11	Elements of Terrain Evaluation
March 29-30	80 SP-12	Military Explosives and their use
April 12-13	80 SP-13	Engineer Play in Games and Simulations

NEW OER SYSTEM

The new Officer Efficiency Report (OER) system will be implemented in full for the Army Reserve effective 1 February 1980. An OER for any period ending on or after that date will be submitted on the new DA Form 67-8. Unlike the Active Army, implementation of the new OER system for the Reserve will *not* be preceded by a closeout report. It is essential, therefore, to the orderly transition of the new system that unit commanders insure the timely preparation and submission of the current OER forms (DA Form 67-7) as they become due. The new system will incorporate the use of a support form, DA Form 67-8-1, to assist the rater and rated officer in determining the job requirements and objectives which will serve as a basis for the OER. Technical advice and/or assistance can be obtained from RCPAC (AV 693-7371/7876).

TRANSFERS TO THE IRR

New Army policy requires that certain enlisted members of Troop Program Units be transferred to the Inactive Ready Reserve in lieu of discharge. The action applies to soldiers separating from the Active Army, the Army National Guard, and the Army Reserve prior to completing their six-year military obligation. The new policy, effecitve 1 October, is designed to assure that no member is discharged who has a potential for useful service under conditions of full mobilization. The new policy applies only to personnel separated for one of the following reasons after successfully completing basic training or at least eight weeks of one-station-unit-training: dependency; expeditious discharge program; hardship; inability to perform prescribed duties due to parenthood; sole surviving sons/daughters and surviving family members; and unsuitability.

Officer Career Info

MAJORS

The critical shortage of engineer majors is a continuing problem, particularly in the area of professional development in "other" specialties. The current utilization rate of 85 percent in specialty code 21 assignments often precludes qualification in an engineer officer's other specialty prior to reaching the primary zone for promotion to lieutenant colonel.

The 1979 selection list for the Command and General Staff College is scheduled to be released in mid-December.

COMPANY GRADE OFFICERS

Most engineer officers aspire to attend graduate school during the first 10 years of military service. Unfortunately, however, Engineer Branch is constrained from approving all requests for graduate schooling. Some of those constraints are explained below:

- *Professional Development Needs.* Attendance at the Engineer Officer Advanced Course and successful completion of a company command tour are minimum requirements. Overseas equity, experience at battalion staff level, and overall manner of performance are other primary determinants.
- *Only those disciplines* verified as "shortage disciplines" are eligible for graduate study. Currently, the shortage list includes Geodetic Science, Engineering ORSA, Engineering Physics, Engineering Nuclear Effects, Engineering Electronics, and ADP. Engineering Administration is not available at this time for full time study and a very limited number of officers will be permitted to study Civil Engineering during FY 80. All shortage disciplines are technical in nature. As a result, undergraduate background (both subject material and grades) is important, since it has a direct impact on an individual's acceptance for graduate school, the duration of schooling, and the individual officer's ability to successfully meet degree requirements.
- *The total number of officers* attending school directly affects our ability to meet other Army requirements. Therefore, Engineer Branch has a ceiling on the total number of company grade engineers who can attend school at any one time under all programs. The result is that schooling remains extremely competitive in terms of manner of performance, professional development, and time in service.

Despite these constrains, Engineer Branch continues to receive and use a full "fair share" of schooling quotos. Officers who feel they meet all the requirements for schooling at the graduate level are invited to apply. AR 621-1 gives application details. Engineer Branch will also respond to written or telephonic queries regarding evaluation of competitiveness for schooling.

OPMD REORGANIZATION

A plan for the reorganization of MILPERCEN's Officer Personnel Management Directorate (OPMD) was approved in August. Scheduled to take place over a 19-month period, the reorganization is designed to provide efficient and effective "life cycle" career management for the Army's officers under the Officer Personnel Management System (OPMS).

VERTICALLY STRUCTURED MANAGEMENT

The approved reorganization plan calls for three vertically structured career management divisions—Combat Arms Division, Combat Support Arms Division, and Combat Service Support Division—responsible for assignments of lieutenants through lieutenant colonels. The Colonels Division and Warrant Officers Division will be retained without change from the present structure.

This vertical structuring will enable OPMD, for the first time since the inception of OPMD, to provide career management based on a "life cycle" concept for commissioned officers. Under the current structure, when an officer is selected for promotion to major, responsibility for management of his career moves from one of the company grade divisions to the Majors Division. Responsibility is again shifted upon that officer's selection for promotion to lieutenant colonel and colonel.

SINGLE POINT OF CONTACT

Under the new structure, an officer's career will be managed by one of the three career divisions from the day he enters the Army as a second lieutenant through selection for promotion to colonel. This not only improves total management but also gives officers a single point of contact throughout their career (01 through 05).

Each commissioned officer will be managed by one of the three career divisions based on accession specialty. Those officers who hold accession specialties 11, 12, 13, 14, or 15 will be managed by the Combat Arms Division. Managing those officers with accession specialities 21, 25, 27, 31, 35, 36, 37, 72, or 74 will be the responsibility of the Combat Support Arms Division. The Combat Service Support Division will manage those officers with accession specialties 42, 43, 44, 71, 75, 76, 77, 81, 82, 87, 88, and 92.

OTHER SPECIALTIES

In addition to an accession specialty, each commissioned officer obtains another specialty by the eighth year of active commissioned service. Officers are then available for assignment in both of their specialties. Accomplishing effective management of officers in both specialties. Ideally, each of the 40 specialties would be managed by a separate career manager. However, because the reorganization structure is to be accomplished within existing manpower resources, providing a separate career manager for each specialty would require expansion of the existing TDA and would be cost prohibitive.

In deciding how management responsibility for these nonaccession specialties would be distributed among the three career divisions, each vertical division was given responsibility for management of nonaccession specialties based upon existing specialty pairings, training, and experience of the officer corps. In most cases, the accession specialty which had the largest percentage of officers holding the particular nonaccession specialty was assigned management responsibility for that specialty. A complete listing of all specialties and the division responsible for managing each specialty is available upon request.

PHASED IMPLEMENTATION

The reorganization of OPMD will be accomplished in phases over a period of

approximately 19 months and will commence once automatic data processing systems support packages can be prepared. Phase I will consist of the reorganization of the functional divisions. Currently, there are three functional divisions: Personnel Operations Division, Professional Development Division, and Officer Distribution Division. Under the new structure, functional operations will be performed by a Personnel and Training Division, an Officer Distribution Division, a Plans, Program and Analysis Division, and an Administrative Support Office.

In Phase II the company grade divisions will be reorganized into three career divisions. The divisions will provide the base for Phases III and IV, which incorporate the Majors and Lieutenant Colonels Divisions into the career management divisions created in Phase II.

Phase V will be devoted primarily to preparing an after action report on the reorganization effort.

An organization chart showing the structure of OPMD after reorganization is also available upon request.

FLEXIBILITY NECESSARY

Although the plan calls for the reorganization to be accomplished over a period of 19 months, a great deal of flexibility will be necessary. Following completion of each phase, that phase will be studied and analyzed before beginning the next phase. The purpose of this analysis is to surface any problems associated with a particular phase and provide solutions to those problems before moving to the next phase. It is expected that through this process the reorganization can be made in an orderly manner and minimize any adverse impact on the officer corps.

In summary, the ultimate purpose of the OPMD reorganization is to achieve "life cycle" management in all OPMS specialties while at the same time develop the most effective organization for wartime. While specific internal actions and implementation dates are not provided in this article, plans are currently being developed to present detailed briefings on the new organization during OPMD visits to officers in the field. Officers are encouraged to take advantage of the various opportunities to learn about the OPMD reorganization and its effect on their career management and professional development in the future.

Commanders Update

LTC ROBERT OLIVER
5th Engineer Battalion (C)
Fort Leonard Wood, MO

LTC CHARLES E. CHANDLER
11th Engineer Battalion (C)
Fort Belvoir, VA

LTC JOHN M. O'CONNOR
15th Engineer Battalion
2nd Armored Division
Fort Hood, TX

LTC CLAIR GILL
13th Engineer Battalion
7th Infantry Division
Fort Ord, CA

LTC LAWRENCE G. AILINGER
20th Engineer Battalion (C)
Fort Campbell, KY

LTC ALBERT J. GENETTI, JR.
43rd Engineer Battalion (CH)
Fort Benning, GA

LTC CAL D. JOHNSON
46th Engineer Battalion (CH)
Fort Rucker, AL

LTC JAMES W. KEYS
92nd Engineer Battalion (CH)
Fort Stewart, GA

LTC DANIEL M. WILSON
299th Engineer Battalion (C)
Fort Sill, OK

LTC ROBERT D. BROWN, III
588th Engineer Battalion (C)
Fort Polk, LA

LTC EVERETT R. THOMAS
864th Engineer Battalion (CH)
Fort Lewis, WA

LTC CARLOS W. HICKMAN
3rd Battalion, 4th Brigade
Fort Leonard Wood, MO

LTC JOHN DORR
9th Engineer Battalion
USAREUR

LTC ROGER F. YANKOUPE
12th Engineer Battalion
8th Infantry Division
USAREUR

LTC DAVID SPANGLER
84th Engineer Battalion (CH)
Schofield Barracks, HI

LTC LEROY PAUL
2nd Engineer Battalion (TOPO)
2nd Infantry Division
Camp Casey, Korea

LTC FRANK PATETE
802nd Engineer Battalion (CH)
Camp Humphreys, Korea

LTC ALEXANDER JOHNSTON, III
326th Engineer Battalion (C)(AMBL)
Fort Campbell, KY

Enlisted Career Info

REVISED PROMOTION WORKSHEET

A revised Promotion Point Worksheet (DA Form 3355) is now being used in conjunction with the semi-centralized promotion system for advancement to grades E5 and E6.

The worksheet is a standarized scoring form used to determine the number of promotion points achieved by each soldier recommended for promotion list standing. The scores from the worksheet are used by DA to determine the promotion point cut-off scores announced monthly by MILPERCEN.

The revised worksheet retains the 1,000 promotion points ceiling, but point categories have been modified and points redistributed. The revised worksheet is designed to provide soldiers competing for promotion with a means to influence their promotion chances. Specific emphasis on the new worksheet was given to those areas where soldiers could increase their points through individual effort and initiative.

Major changes on the new worksheet are summarized below:

- SQT: Points will be based on the "GO" Raw Score shown on the Individual Soldier Report (ISR). This change permits more timely use of test results. Adjustment of points, however, will occur only during normal recomputation periods.
- NCOES Course: E4s who complete the Primary Leadership Course, the Primary Noncommissioned Officer Course, or the Primary Technical Course will be awarded 30 points. E5s are awarded 30 points for completion of the Basic NCO Course or the Basic Technical Course. The new worksheet also recognizes completion of OJE (on-the-job-experience) by awarding 15 points for certification at the time of initial board appearance, and one point per month thereafter, until a total of 30 points are achieved. Soldiers and commanders should recognize that resident course attendance is the best and quickest means of achieving the maximum number of points in this item.
- Awards and Decorations: The value of points for peacetime awards and decorations has been increased. Additional badges have been included for points, and Certificates of Achievement now qualify for the award of points.
- Correspondence Subcourse: The point value has been tripled to one promotion point for each five credit hours satisfactorily completed.
- High School: The soldier who has a high school diploma or GED equivalency certificate will be granted 75 points.

Although use of the new worksheet began in October, promotions based on the new scores will not begin until January 1980. Until then, the old scores will continue to be used in determining promotions. New worksheets and scores for promotion to E5 become effective 1 January, while the effecitve date for promotion to E6 is 1 February 1980.

COUNSELING STATEMENTS

An increasing number of career soldiers are refusing to take the necessary actions to meet length-of-service requirements which make them eligible for overseas reassignment. To be eligible for an overseas assignment, soldiers must have at least 12 months remaining in the service upon their arrival overseas. Anyone with less than 12 months remaining has the option of extending or reenlisting to meet this minimum time-in-service requirement. *Or* he may sign a counseling statement and be deleted from orders.

But feedback from soldiers who sign counseling statements indicates that in many cases they are not aware of the total consequences of their actions. A counseling statement is a self-imposed bar to reenlistment and places a soldier in the following status: he loses his promotion eligibility; he is prohibited from reenlisting for at least 93 days following separation; he loses his option to reenlist even after 93 days without first obtaining a DA approved waiver. If the waiver is obtained, he still loses at least two grades from the grade he held at the time of his discharge.

Requests to withdraw counseling statements prior to ETS can only be approved by MILPERCEN for soldiers serving in CONUS and only by the major overseas commander for soldiers serving overseas.

REVISED PROCESSING SYSTEM

In an effort to streamline reassignment processing, a new regulation, AR 612-10, has been written and is being distributed to the field. It became effective 1 October and includes significant improvements in the methods used to prepare soldiers for reassignment.

Key areas which the new reg addresses are reassignment processing and the sponsorship and orientation program. It applies to all soldiers in grades E5 through O6 and also to those E1s and E4s who desire to move their dependents to or from an overseas area at government expense. It also applies to those junior enlisted soldiers who are AIT graduates and have dependents with medical, dental, physical, emotional, or intellectual problems. It does *not* apply to soldiers being reassigned between units on the same installation, to those being reassigned to schools as students, or to those being reassigned for separation purposes.

The system outlined in the new reg is designed not only to make reassignments easier for soldiers and their dependents, but also to lessen the workload for MILPOs and commanders. Specific responsibilities have been assigned to each of those individuals involved—the gaining and losing commander, the MILPO, the appointed sponsor, and the soldier being reassigned. Meeting

these responsibilities is critical to the success of the system, so if you're facing a reassignment in the near future, get hold of a copy of the new reg and look it over. It could save you a lot of headaches later.

OCS CHANGES

Until recently, soldiers attending OCS did so in a PCS status. It has now been determined that the 14-week course is more appropriate for temporary duty (TDY) than a permanent change of station. Therefore, unless candidates are assigned Specialty 11 (Infantry), they will attend the course in a "TDY enroute" status.

Those candidates assigned Specialty 11 and those selected for Ranger training following completion of the course will be assigned PCS to Fort Benning, the only location for officer candidate training since 1973.

Another OCS policy change relates to the assignment of accession specialities. Previously, candidates did not receive their speciality designation until they had completed roughly three-fourths of the course. Each candidate now has this information prior to departing his old duty station for Fort Benning.

The new procedure allows the soldier whose ultimate assignment is to a CONUS installation to leave his family in current housing, or move them to the ultimate duty station. Candidates whose ultimate assignment is overseas have no option; they must leave their dependents in current housing, unless they choose to move them at their own expense. Government quarters will not be available at Fort Benning for dependents of officer candidates, except those assigned accession Speciality 11 and PCS'd to Fort Benning.

The deadline for receipt of OCS applications for Class 3-80, scheduled to begin on 6 April, 1980, is 7 January. The Application for Appointment, DA Form 61, must be submitted through channels to MILPERCEN.

INSTRUCTORS NEEDED

Second career opportunities are now open to Army officers and NCOs (01 to 06 and E6 to E9) in Army Junior Reserve Officers' Training Corps (AJROTC). Personnel who are within one year of retirement or who have retired within the last five years may qualify. AJROTC is offered at 670 high schools nationwide. Instruction includes leadership development, map reading, marksmanship, methods of instruction and military history. Classroom instruction is augmented by military drill, orientation trips, field trips, mini-summer camps, and orienteering. Additional information concerning pay, working hours, benefits, etc., may be obtained from ROTC Region Headquarters at Fort Bragg, Fort Knox, Fort Riley, or Fort Lewis.

The Missing Issue

If you did not receive a Summer edition of ENGINEER Magazine, the reason is simple. We did not publish a magazine labeled as the Summer edition. The Spring edition, published in May, was followed by the Fall edition, which you should have received in early September. We skipped the Summer edition—on paper, only—so that the magazine would reach the field at the *beginning* of each season, rather than at the tail end. Henceforth, you can expect to recieve quarterly issues at or near the onset of Spring, Summer, Fall, and Winter.

The School Solution

You decide to reduce the first crater astride the highway and to reduce the log crib on the bypass road. To breach the crater, you must first eliminate observed enemy fire. So, you request obscuring smoke and suppressive artillery fire on the enemy's direct fire positions. Since wind and inversion conditions are favorable, you also decide to use smoke pots to form screens at all three work sites.

To reduce the first crater, first clean all mines manually (blow in place) from the vicinity of the work area around the lips of the crater. Then fill approximately three meters on each side of the crater and employ the AVLB to span the remaining 16-meter gap. Use the CEV to backfill and achieve minimum compaction. An estimated 72 cubic meters of fill is required, which is equivalent to 16 5-ton dump truck loads. Two trucks will have to make five round trips to the borrow pit 600 meters away, while one truck will have to make six round trips to the pit. You estimate that it will take approximately 30 minutes to fill and another five minutes to place the AVLB across the crater gap.

In reducing the log crib, you must first clean a mines manually from the crib's vicinity. The destroy the front and rear vertical posts wit timber-cutting demoliton charges. Place 30 to 4 pounds of demolitions in the backfill at two-third the depth of the fill. Then tamp and detonat simultaneously. Clear the resulting rubble manual ly.

There are three factors in the breaching opera tion. First, the observed enemy fire must b eliminated prior to the breaching attempt. The se cond factor is the tactical commander's priorities Although the CEV is ideally suited for destroyin log cribs, it could not be used for that purpos because of tactical priorities. Third, you must in sure that your platoon leader recovers the tw AVLBs as soon as trail elements of the task forc have passed the crater so that they will be availabl for use again as the TF advances. Of course, yo should advise your battalion commander or S- that the craters exist. Repair of the craters fo passage of division rear elements is his responsibili ty.

We've got a problem. ENGINEER Magazine is published for the benefit of all Army engineers, including Engineer officers, Engineer enlisted personnel, and DA civilians employed in engineer-related jobs. The problem is that apparently many of them never see the magazine. During recent months, I have increased the number of copies mailed to many engineer units/activities, but I fear that more copies-per-unit/activity is not the solution. I think the solution lies with commanders, activity chiefs, first sergeants, command sergeants-major, and others responsible for getting the word down to troop level. Apparently too many magazines are winding up in the desks, lockers, or quarters of individuals, rather that in dayrooms, offices, lounges, and other places where engineer personnel congregate. With a limited press run dictated by a tight budget, it is impossible to increase free distribution by a substantial amount. So read it and pass it on, or pay the price for your own personal subscription.

Editor

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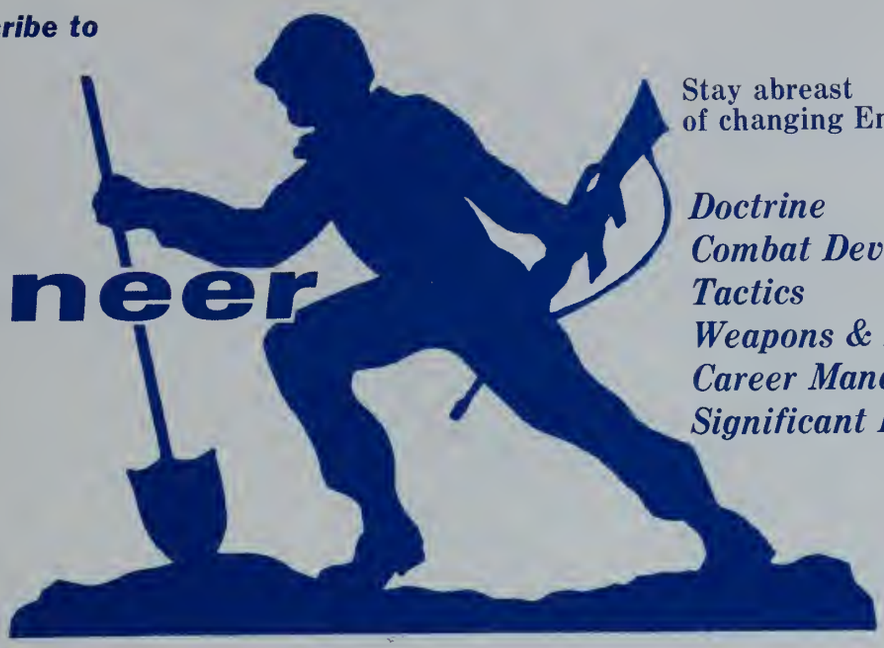

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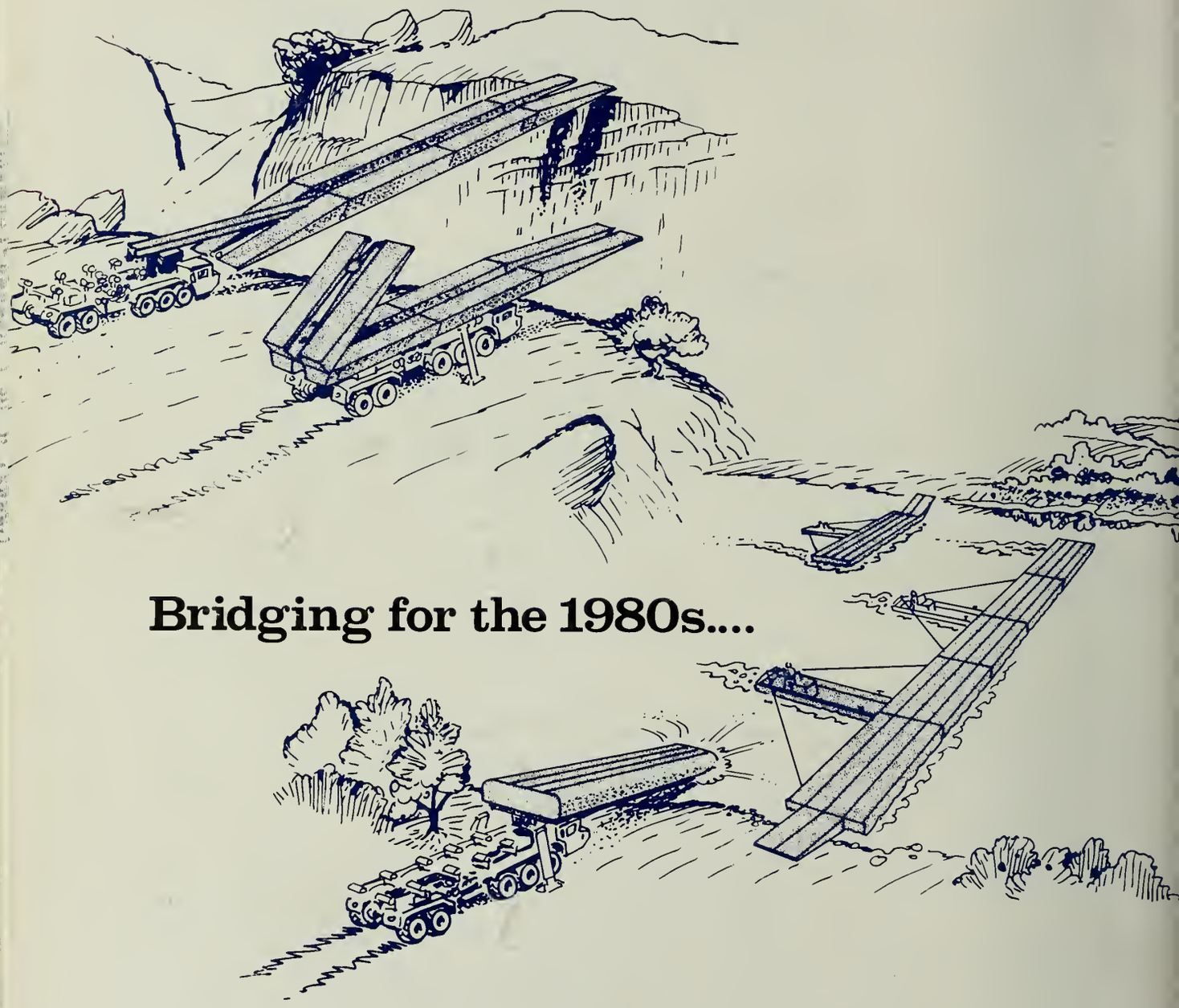

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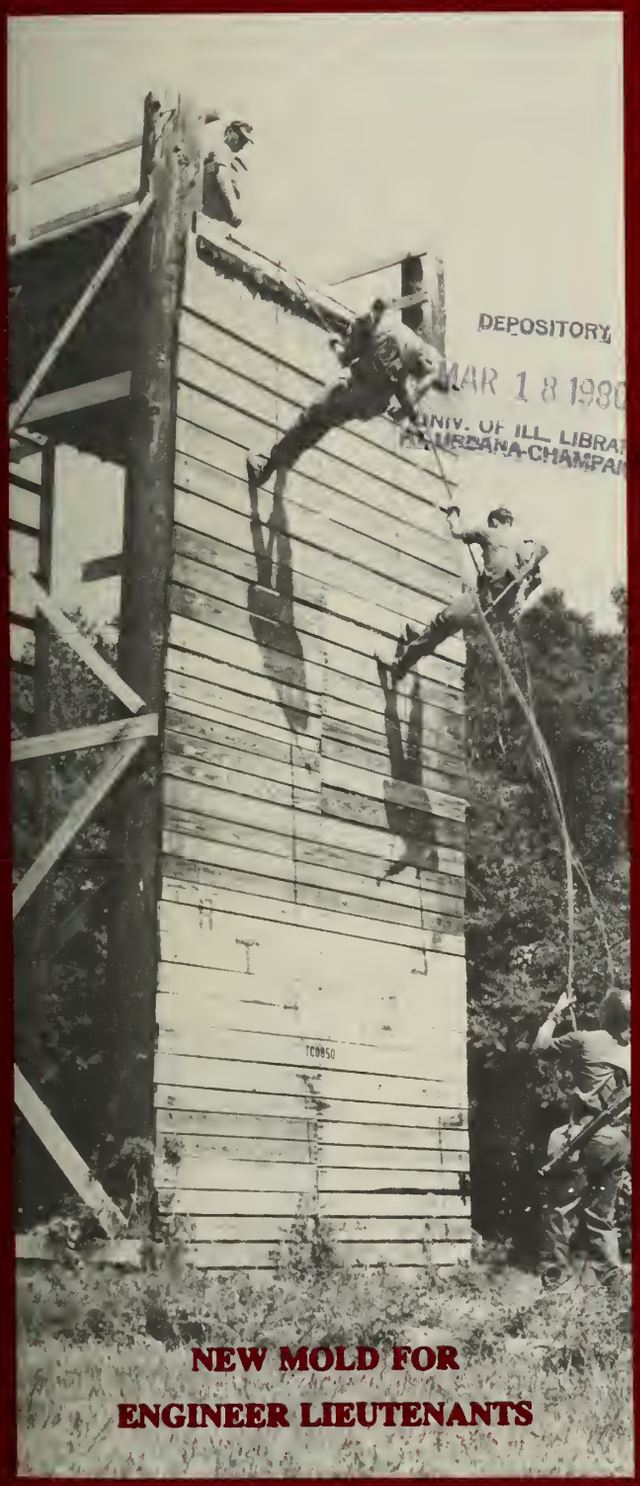

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NEW MOLD FOR ENGINEER LIEUTENANTS

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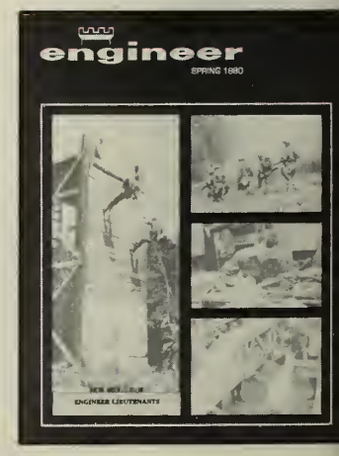
THE COVER

Improvements in the Engineer Officer Basic Course have resulted in the best trained engineer lieutenants in history. SP4 Jim Eady, SP5 Lynn Gilderhus, and Oscar Gatlin, Jr., shot the cover photos of EOBC activities. See page 6 for the full story.



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VOLUME 10 SPRING 1980 NUMBER 1

FEATURES

6 NEW MOLD FOR ENGINEER LIEUTENANTS
by SP4 Jim Eady

11 TECHNICALLY QUALIFIED, TACTICALLY PROFICIENT
by CPT Dana Robertson

14 THE 18TH ENGINEER BRIGADE

18 "MAGIC"
by LTC Bruce W. Baumann

20 THE TOTAL FORCE
by CPT Barry D. Willard

20 COMBINED ARMS TRAINING FOR THE RESERVE COMPONENTS
by LTC William I. Travis

24 A NEW LOOK IN TOPOGRAPHIC SUPPORT
by COL Daniel L. Lycan and Val E. Sellers

28 TEC—5 YEARS LATER
by MAJ Charles F. Hanselmann and Jerry Perlman

30 ARTICLE 15, NONJUDICIAL PUNISHMENT
by LTC Steven Chucala

page 8

page 30

page 39

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DEPARTMENTS

2 NEWS & NOTES
5 LETTERS
32 OFFICER CAREER INFO
34 ENLISTED CAREER INFO
36 ENGINEER PROBLEM
37 NCO CHANNELS
38 RESERVE COMPONENTS
40 THE SCHOOL SOLUTION

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NEWS & NOTES

Personnel from three engineer battalions at Fort Bragg, N.C.—the 27th, 307th, and 548th—recently demolished five highway bridges located within the B. Everett Jordan Reservoir area that is scheduled for impoundment in the Wilmingon, N.C. Corps of Engineers District. Each bridge was on a secondary road that had been relocated and closed to public traffic in preparation for the impoundment. The demolitions exercise exposed the Wilmington Civil Works staff to a military operation and, at the same time, provided troops with realistic training.

UP IN SMOKE

TOPO LAB SUPPORTS MX MISSILE

The latest members of the Corps of Engineers family to join in support of the MX Missile Program are geodesists and engineers at the Engineer Topographic Laboratories (ETL). Their job for the next six years will be to develop the precise survey technology needed to pinpoint the network of 4,600 missile shelters. ETL has been tasked by the Corps and the Defense Mapping Agency to increase the precision of existing inertial surveying systems and eventually to produce a new system that will be more accurate than any now available. The immediate task is to test and perhaps modify the automated equipment for land surveys that has been used by some Corps divisions and districts as well as by the Defense Mapping Agency.

B/76 MOVES TO FORT DRUM

Company B, 76th Engineer Battalion (CH) will permanently transfer from Fort Meade, MD, to Fort Drum, N.Y., in April. Fort Drum has a requirement for increased engineer effort to enhance the readiness and quality of life of the large number of soldiers and units that train there. The Army announced last year that an engineer battalion will be permanently stationed at Fort Drum during the next three years. Company B is the first company to be stationed there. The remaining companies necessary to complete a battalion will be selected later. Company B's authorized strength is 194. In mid-January, the assigned strength was 135.

RECRUITER DRAFT SET

Approximately 1,000 soldiers will be selected for *involuntary* recruiting duty by the end of March to help meet FY 80 recruiting goals, according to DA officials. A test of involuntary recruiting assignments was conducted during FY 79 for about 500 NCOs selected from CONUS posts. The program was expended to overseas commands for FY 80 and involves shorter overseas tours for some soldiers. For the present, soldiers in the following MOS are not being selected: 05H, 11H, 13F, 16R, 27F, 31E, 31S, 35M, 45K, 97B, and 98C. This list, however, is subject to change without prior notice.

BATTALION MASCOT

The 11th Engineer Battalion, which has worn a black panther unit crest for more than 50 years, officially adopted a real black panther as its mascot during recent ceremonies at Fort Belvoir, VA. A representative of the National Zoo, where the two-year-old female cat will remain, accepted official orders and dog tags during the ceremonies. The cat's name is Naki, which means "destroyer" in one African dialect.

PEOPLE

The first engineer officer to be slected for promotion to temporary brigadier general from a facilities engineering slot is *COL Mark J. Sisinyak*. Four other engineer officers were also selected for the BG List, including *COL Richard S. Kem, COL Donald R. Morelli, COL Donald M. O'Shei,* and *COL George W. Withers, Jr.* . . . . . *Dr. James Chormokos, Jr.*, is the new chief of the Research and Development Office, U.S. Corps of Engineers . . . . . *Loyd A. Duscha* is the new chief of the Engineering Division, Civil Works Directorate, OCE.

1980 ENGINEER DIRECTORY

The 1980 Corps of Engineers Officer and Warrant Officer Directory is now available through the Main Post Exchange at Fort Belvoir, VA. The price is $1.60 per copy. The Directory includes the names and addresses of all Primary and Alternate Specialty 21 officers and those officers with a control branch of Engineers. It also includes warrant officers with a primary/alternate specialty of 621A, 811A, 821A, 833A, and 310A.

NBC OLYMPICS

Contestants race against time to treat a "victim" on the reaction course during the 2nd Annual NBC Olympics hosted by the 7th Engineer Brigade in Kornwestheim, Germany. The 237th Engineer Battalion won the reaction course competition, but the 9th Engineer Battalion took top unit honors by placing first, second, or third in each of five events. Other events included the free-style decontamination contest, the one kilometer relay, the 800-meter run, and volleyball. The purpose of the NBC Olympics is to focus attention on nuclear, biological, and chemical training, and to increase unit readiness. (Photo by PVT Winston Wilson)

NEWS & NOTES

PURCHASE POSTPONED

Procurement action for the Ribbon Bridge Erection Boat (RBEB) has been postponed pending an evaluation of the United Kingdom Combat Support Boat (CSB) and a similar boat designed by Alcoa. Upon completion of the testing in July, a selection of one of the three boats under consideration will be made and a letter contract awarded not later than 30 September. Subsequent to the cancellation of the procurement action, the Office of the Deputy Assistant Secretary of the Army (Acquisition) withdrew approval of the procurement plan for the standard boat with welded hull. A new or updated procurement plan must be approved before further procurement action can be taken.

FACTS AND FIGURES

Military strength figures for 30 November 1979 were: total DOD 2,029,194; Army, 765,602; Navy, 521,337; Marine Corps, 183,793; Air Force, 558,462. These figures represent full-time military personnel comprising both regulars and reserves on continuous active duty, as well as officer candidates, cadets attending Army and Air Force military academies, and midshipment at the Naval Academy. The Army figures include more than 400 general officers. As of 30 November, brigadier generals numbered 208, major generals 164, and lieutenant generals 32. Nine officers, in addition to General Edward C. Meyer, Army Chief of Staff, held the rank of general (four stars): Bernard W. Rogers, William A. Knowlton, Frederick J. Kroesen, John W. Vessey, Jr., John R. Guthrie, Donn A. Starry, Robert A. Shoemaker, John A. Wickham, Jr., and Volney F. Warner.

ORGANIZATION DAY

Soldiers of the 79th Engineer Battalion in Karlsuhe, Germany, compete in the pie eating contest during the unit's Organization Day activities last September. Other activities included a nail driving contest, egg tossing, wood chopping, log sawing, and several races. But from the looks of it, the pie divers had the most fun. (Photo by PVT James Honeywell)

LETTERS

"MGB MYTHS AND MISUNDERSTANDINGS"

Dear Sir,

In the Fall 1979 issue, Captain Hambric's article, "MGB Myths and Misunderstandings," laid to rest any technical doubts on the subject. However, he also challenged the doctrinal issue of a multi-bridge (MGB/Bailey) company proposed by Major Ramsey in the Winter 1978 issue. Each author listed basically only two arguments for/against this proposal. Pro arguments detailed the nonlikely assault role of either panel bridge and the ability to respond to the most likely requirement. Rebuttals listed the difficulty of dual training/readiness and command/control of widely separated work parties. Captain Hambric departed from his expertise in his haste to defend a single bridge company, for both of his arguments apply to either concept. As separate companies, each has the capability to erect two bridges simultaneously in widely separated locations. This possibility is independent of the single-versus-multiple bridge concept. It is expected that the higher headquarters would strive to keep missions within a close proximity when possible. When this is not possible, the platoon leader and platoon NCOs have all the ability to operate alone, something Captain Hambric seems to doubt. Secondly, dual (MGB/Bailey) training is required for all personnel of the company who possess MOSC 12C, Bridge Crewman. They must pass SQT in the technical aspects of both bridges. These assets are here to stay. The Bailey outnumbers MGB more than six to one (12 to 1 in Europe). Maintainability is mostly a function of money, as sandblasting and painting will restore serviceability. Simple arithmetic will show that an MGB Company will be hard pressed to avoid erecting Bailey. Erection sets are also in stock and the MGB has one more than the required 29 five-ton dump trucks to pick up a set. Therefore, the advantages proposed by Major Ramsey are more than sound. Serious consideration should be given to the dual mission company. TOE need not be changed; the implementation of this concept can be accomplished by MTOE. And accomplished it should be, for an additional reason: combat support assets must be minimized to allow the maximum of combat assets, including engineer assets, to be deployed forward in Europe.

DOUGLAS K. Lehmann
Falls Church, VA

"CHALLENGES TO ENGINEER DOCTRINE"

Dear Sir,

This letter is addressed to Major Stephen E. Draper's article, "Challenges to Engineer Doctrine," which appeared in the Fall 1979 issue of *ENGINEER*. The conclusions of Major Draper's article on challenges to engineer doctrine are correct, and while already in practice in some units, should be adopted as doctrine. Not too long ago, it was the approved solution to always dismember the Direct Support company such that each maneuver task force received a platoon and each company team received a squad of engineers. This often made meaningful support impossible, since it stretched the command and control, and logistical support capabilities of the company and platoon headquarters to the breaking point. The final result too often was lost, unfed, and non-working squads, whose platoon leaders had become pure "advisors." These problems are alleviated if Major Draper's suggestion of allocating resources on a task basis is adopted. Further, we should consider the entire framework of engineer taskings within the division. It may become necessary to switch the "normally associated" Direct Support company from one brigade to another, notwithstanding all the advantages which that association accrues. For example, when the counterattack eventually is made, the lead task forces' requirements would dictate an entire DS company per task force. Clearly, they will be needed, and equally clearly, "soft" Corps combat engineer units will have survivability problems. A plausible solution is to concentrate the divisional engineers and let the Corps units fill in the "risk" areas. As mobility and countermobility become more important, we must insure that our engineers also "get there fustest with the mostest."

Captain Dominic Izzo
California Institute of Technology
Pasadena, CA

UNIT LISTING

Dear Sir:

We, in the ROTC Instructor Groups, who are producing engineer officers, are in need of a current listing of engineer units and their locations. Recommend a future issue include current locations of active engineer battalions in CONUS and overseas. Those overseas should also name the location and the zip code. Similar information for USAR and ARNG units would also be helpful and informative to the entire Corps.

MAJ Charles G. Marvin
PMS, University of Missouri-Rolla

Space limitations preclude publishing the addresses and locations of all Active and Reserve Component engineer battalions at this time. However, the information you requested is available in the Engineer Units and Advisor Directory *published by The Engineer School and distributed to all Active and Reserve Component engineer units company size and larger. The 1980 directory is scheduled for publication in March and should reach the field in early April. You may request a copy of the 1980 directory by writing to: US Army Engineer School, Training Management Division ATTN: ATXA-DTR (Unit Training), Fort Belvoir, VA 22060, or telephone commercial 703-664-3008 or AUTOVON 354-3008.*

Apologies to members of the 2nd, 9th, and 15th Engineer Battalions for the incorrect identification of their respective units under "Commanders Update" in the Winter 1979-80 issue of *ENGINEER*. The correct designations are:

2nd Engineer Battalion 2nd Infantry Division Camp Casey, Korea	9th Engineer Battalion (c) USAREUR	15th Engineer Battalion 9th Infantry Division Fort Lewis, WA

New Mold for ENGINEER LIEUTENANTS

Hands-on training and new class structure are keys to improved Office Basic Course

by SP4 Jim Eady

Left, students get hands-on training with medium girder bridge. Below, students plot reconnaissance route during FTX at Fort A.P. Hill

The only true test of the effectiveness of military training is war, but most experienced observers, including senior NCOs and officers alike, agree that today's new engineer lieutenants are the best trained in our history.

The Engineer Officer Basic Course (EOBC), a mandatory 14-week course of intensive instruction for all new engineer lieutenants, has always ranked among the best branch basic courses. But its reputation has been considerably enhanced in the three years since undergoing major surgery in 1977. Two significant improvements emerged at that time. One was the implementation of extensive hands-on training. The other and more significant improvement was a completely redesigned class structure that emphasized the development of leadership ability.

Classroom size was reduced from about 120 students to about 40 students, or normal platoon size. Three trainers were assigned to each platoon—one captain, one first lieutenant, and one senior NCO. But the students, themselves, were assigned to the leadership positions within each student platoon. Each student served as platoon leader, assistant platoon leader, or squad leader for at least one week during the 14 weeks.

Continuous monitoring of student performance, both in the classroom and in a hands-on environment, is a dominant characteristic of the

new EOBC. Students are evaluated as both leaders and followers and counseled on their performance in each category. Ample opportunity is provided for self-improvement and for achieving high standards in academics, leadership, and physical fitness.

Platoon trainers actually conduct about half of the training; thus, they play a significant role in student development. An integral part of almost every training day is "trainer's time," a replacement for the old "commander's time," which was essentially a free period. "Trainer's time" provides students with an opportunity to clarify classroom misunderstandings and misconceptions, and to gain a better perspective of their individual progress.

Captain Kerry Pierce, a graduate of the old course and now an EOBC trainer, believes the changes have significantly upgraded the quality of instruction.

"When I went through the course, instruction was very impersonal," says Pierce. "There was very little of the troop-related things that are important when students go to the field. With the new platoon structure, students get interaction with a lot of troops, NCOs, and experienced officers. It gives them a better idea of what they'll be doing in their assignments."

The decision to incorporate hands-on training into the EOBC schedule resulted from a TRADOC directive that all new lieutenants would be trained in the individual tasks of their enlisted counterparts. In response to the directive, Engineer School administrators pinpointed the skills critical to engineer lieutenants, established minimum standards of performance, and devised methods of testing those skills.

From that time on, students weren't simply told how to operate bulldozers, they were given the opportunity to actually do it. And to complement the hands-on training, instruction was provided on management of personnel and equipment

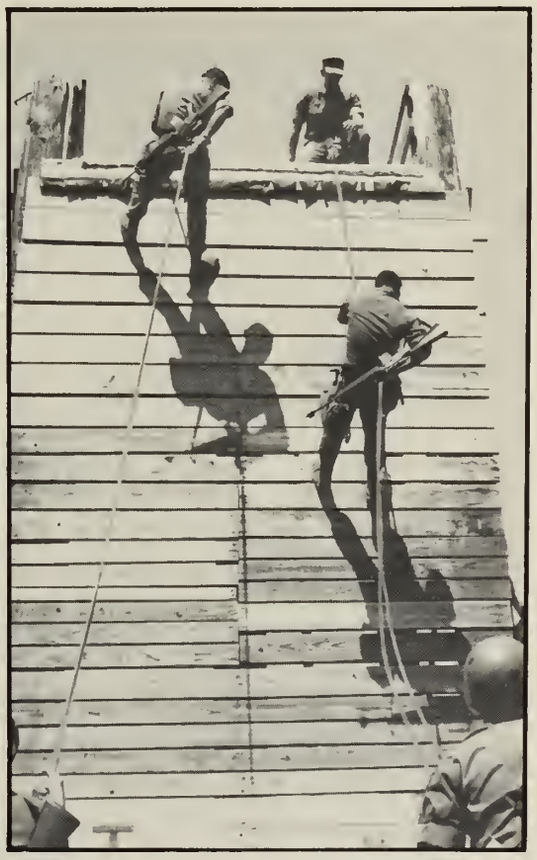
Above, EOBC student mans machine gun during reconnaissance exercise. Below, platoon trainers take time to evaluate students' progress during FTX

resources. Afterall, planning, directing, and managing are the primary tasks of new engineer lieutenants, according to Major Joel Boyd, Chief of the EOBC Training Division at the Engineer School.

"The hands-on training helps students understand what is involved in soldier tasks," says Boyd. "They know the impact on the soldier and, most importantly, they know if the job is being done right."

EOBC is now conducted in three phases, each phase representing a different area of soldiering. The first phase covers general military skills, such as physical training, rifle marksmanship, and first

Students at left prepare demolition charge for log crib. Below, student reviews notes during preparations for FTX



Engineer lieutenants learn techniques of rappelling during EOBC

EOBC students use probe to search for mines during reconnaissance mission

aid. The second phase deals with combat construction. And the third phase is strictly combat engineering. A total of 161 engineer tasks are taught on a "go/no-go" basis. Each student is permitted three chances to satisfactorily perform each task. Any student who does not get a "go" on every task does not graduate. Its that simple.

Since the new curriculum includes more than mere classroom lectures, it may appear, on the surface, much tougher than the old curriculum. However, the hands-on concept of training has actually made the learning process easier and more efficient, according to Major Boyd.

"The course is probably easier to pass now than before it was revised because students now have a chance to apply the fundamentals they're taught in the classroom" says Boyd. "It makes learning easier."

The climax of EOBC is a seven-day field training exercise (FTX) at nearby Fort A.P. Hill. During the exercise, students perform a multitude of tasks, including weapons qualification, tactical bridging, true demolitions, minefield reconnaissance, and route and river reconnaissance. Many tasks, such as tactical bridging, are accomplished during hours of darkness.

The Engineer School's Directorate of Evaluation conducted a survey last year in an effort to determine the effectiveness of the revisions to EOBC. Although objective conclusions could not be derived from the collected data, comments by many field commanders reinforced the belief that engineer lieutenants are, in fact, better trained than ever before.

One commander surveyed said, "In general, the problem with new lieutenants is a lack of experience, not a lack of education or training. We will give them the experience. Therefore, I have no recommendations for EOBC training, whatsoever. I am perfectly satisfied with your product."

Another commander responded, "From what I have heard of the new EOBC, I wish I had had the current course of instruction when I went through in 1963."

There is little doubt that new lieutenants still require a "climatization period" when they graduate from EOBC and report for their first duty assignment. But thanks in large part to the revised EOBC curriculum, the period of climatization has been reduced substantially in the last 2–3 years. EOBC still has a few "kinks" that need to be ironed out, but overall, it now provides the hands-on and leadership training required to instill real confidence in new engineer lieutenants.

What will it take to fully integrate the engineer system into the maneuver element's battle plan?

THE BATTLEFIELD

Tactically QUALIFIED, Technically PROFICIENT

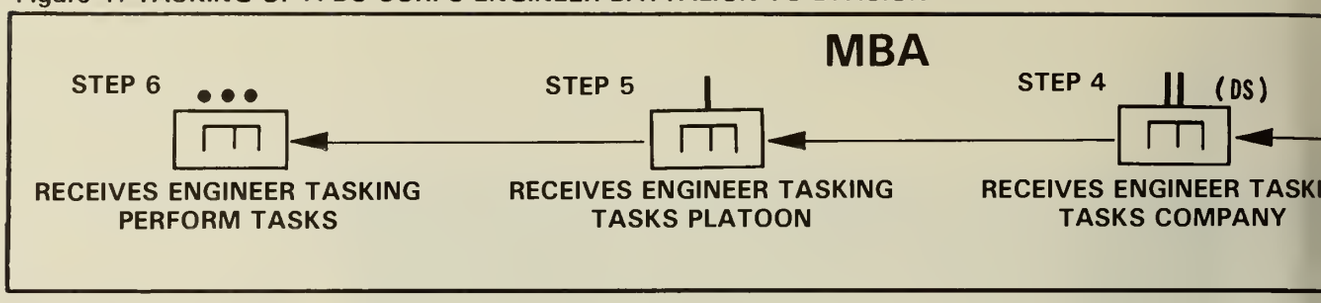
by CPT Dana Robertson

If we are going to win the first battle of the next war, engineers must be doers as well as advisors. We have to be an active, risk-taking partner with the rest of the combined arms team. This partnership involves providing the support necessary to fully use terrain and, therefore, enable the maneuver commander to "fight outnumbered and win."

In addition to mastering the technical aspects of combat engineering, the engineer must also fully understand the basic doctrine and concepts of the manuever element. Only then can he properly employ all components of engineer systems to support the maneuver plan. The engineer's ignorance of maneuver tactics and operations may have little or no effect in a peacetime training environment and, in fact, may never be identified as a shortfall in the normal course of maneuver unit training. It could, however, be the difference between success or failure on the battlefield and, therefore, must concern every engineer.

The engineer commander cannot integrate engineer systems with the maneuver element's battle plan without first understanding the tactics and operations of his own maneuver element and those of the Threat. Due to the rapid pace of warfare projected by Threat doctrine, the engineer may have to integrate engineer systems with the maneuver element's battle plan in the absence of the maneuver commander. The engineer must be

Figure 1. TASKING OF A DS CORPS ENGINEER BATTALION TO DIVISION



able to take appropriate, aggressive action based upon his knowledge of the tactical situation. Decisions will have to be made on time and without error—the first time.

In the past, our ability to integrate the engineer system with the maneuver element's battle plan has often been less than satisfactory. We can expect this situation to continue as long as we consider the engineer system without first identifying the needs and limitations of maneuver elements. We must continually emphasize the potential of the engineer system as a combat multiplier on the battlefield. Other members of the combined arms team will demand engineer support if they are convinced it has value to them.

Engineers can employ various means to gain an insight into maneuver element tactics. One method involves studying Field Manuals which form the basis for maneuver element tactics. FM 71-1, FM 71-2, and the new FM 71-100 should be as familiar to the engineer as FM 5-34 and the long awaited FM 5-100.

In addition, a knowledge of maneuver tactics can be gained by frequent association with the maneuver commander. This association will allow each to understand the other's limitations and strongpoints. Pertinent information should be filed in the engineer's notebook for easy reference.

For the integration process to be complete, the engineer must be active during the early stages of the maneuver element's planning. Terrain structuring, whether in the offense or defense, is primarily an engineer responsibility which must be accomplished prior to committing maneuver forces. To expect the engineer to develop the terrain as an effective combat multiplier in the final stages of planning is unrealistic.

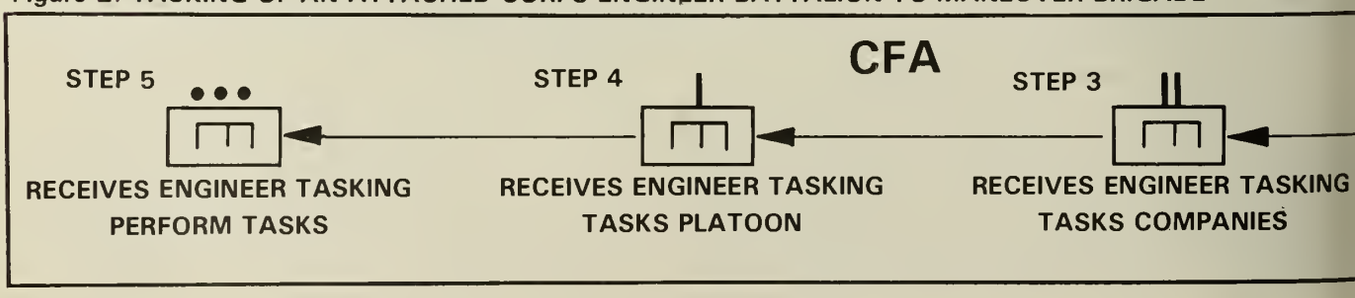
A beneficial by-product of the integration process will be the development and procurement of new combat engineer equipment. Other members of the combined arms team must be convinced that engineer equipment which enhances the maneuver element's mobility and survivability while reducing Threat mobility are as indispensable as new high-performance aircraft, XM1 tanks, and infantry fighting vehicles.

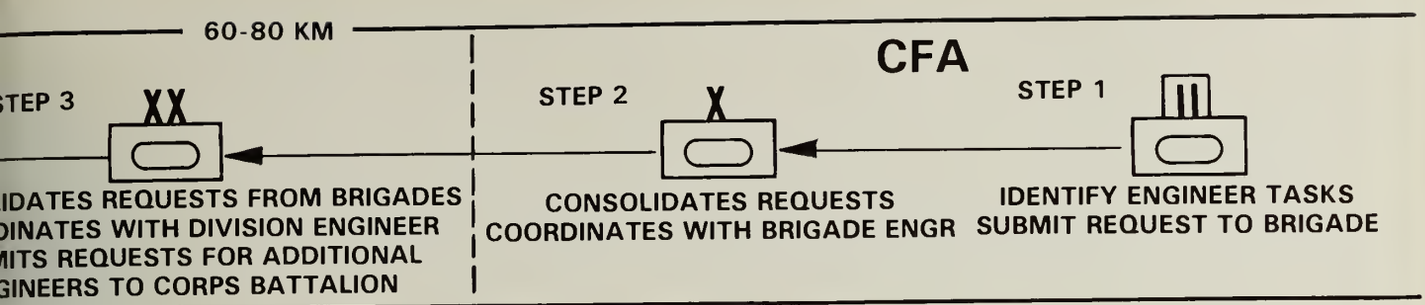
The integration of the engineer system with the maneuver element's battle plan is also restricted by the mis-utilization of engineers. This problem results when engineer commanders are not cognizant of the constraints and limitations of each of the various command and support relationships. These relationships will often have an impact upon engineer efforts to adequately support maneuver elements.

All too often, the engineer commander, especially at higher levels, opts for a support relationship (DS or GS) instead of a command relationship (opcon or attachment). Although the engineer commander maintains "command" over his subordinate units with a support relationship, he is limiting the support provided to the maneuver element and the flexibility of his subordinate engineer commanders to respond to the needs of the lower echelons.

When deciding how to best employ his engineers, the commander must examine every aspect of the tactical situation, starting with the needs of front line maneuver elements, down to and including task force level. For example, consider the situation where the Corps Engineer has placed a corps engineer battalion DS to a division. Engineer requirements for the division

Figure 2. TASKING OF AN ATTACHED CORPS ENGINEER BATTALION TO MANEUVER BRIGADE





will preclude placing all divisional assets in the CFA. Hence, a mixture of corps and divisional engineer units is required.

Can the DS corps engineer units provide support to the CFA, given the logistical and command constraints imposed by the distance between the parent battalion and its companies, or between the Corps battalion and its parent brigade? In most cases, the parent engineer unit will find it next to impossible to command and logistically support its subordinate units due to the excessive operating distance between units.

In addition to the limitation imposed by distance, consideration must also be given to whether the corps engineers can provide timely support at the task force level. The normal procedure for requesting engineer support from a unit which is DS to the division appears in Figure 1. Responsive engineer support to task forces located in the CFA cannot occur in this particular situation. The same constraints exist in the Main Battle Area. Engineer companies must frequently operate at a great distance from their parent battalion. Hence, the battalion commander is still faced with the command and logistical support problems associated with providing engineer support to the CFA. Task forces must request engineer support through lengthy communication channels, which may limit responsive engineer support. This example illustrates the fact that inappropriate assignments result in unresponsive engineer support, as well as the creation of logistical and engineer related problems.

The logical solution is attachment. This allows the maneuver commander efficient and timely engineer support. With the corps engineer battalion attached to the division, engineer companies and platoons can be attached to maneuver brigades and task forces, respectively. As Figure 2 illustrates, engineer request channels are shortened, resulting in faster and more flexible engineer support. Note that the distance between the task force and the engineer company has also been substantially reduced.

Historically, engineers have opted for support relationships. Engineer commanders could thus still exercise their command option. In reality, however, the extended distance between the engineer commander and subordinate units prevented a true command relationship. As a result, maneuver elements have taken certain liberties which, in effect, created quasi-command relationships between themsevles and engineer units. This has further added to the confusion over command and support relationships. It is high time that the engineer community take a look at those command and support practices which do not maximize engineer support to maneuver elements.

There are no shortcuts or alternatives for providing maneuver elements with engineer support. The engineeer must understand the maneuver element's tactics and operations, as well as his own. Every effort must be made to fully employ the combat engineer on the battlefield. Only then will integration of the engineer system with the maneuver element's battle plan take place. Only then will we be truly considered part of the combined arms team.

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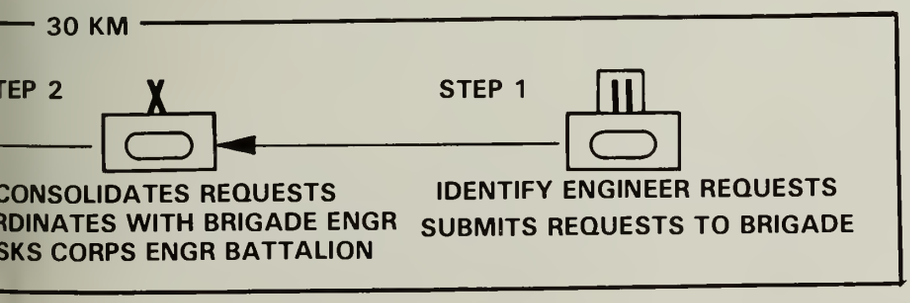

★ Note that the distance between the Task Force in step 2 and the Engineer Battalion in step 3 is kept to a minimum to allow for responsive Engineer support.

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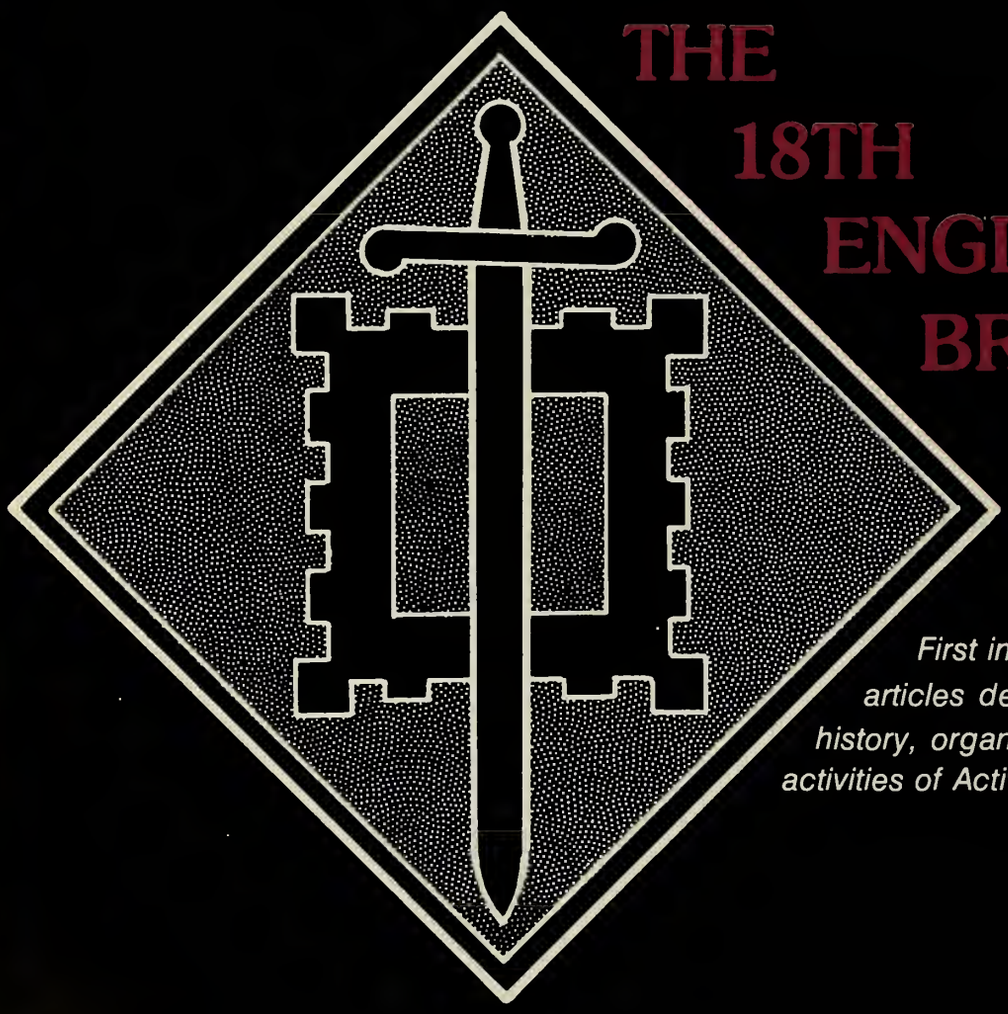


THE 18TH ENGINEER BRIGADE

First in a series of articles describing the history, organization, mission, and activities of Active Army engineer units

The 18th Engineer Brigade has a relatively short, but distinguished history which began on 29 July 1921, when its predecessor, the 347th Engineers, was constituted as an Organized Reserve unit. The regiment was ordered into active military service on 6 May 1942 at Camp Claiborne, LA, and was reorganized and redesignated the 347th Engineer General Service Regiment.

The regiment was deployed to England in August 1942 and remained there until June 1944, when it joined the American Expeditionary Forces in the campaigns of Normandy, Northern France, Rheinland, and Central Europe. The 347th later received the Meritorious Unit Commendation for service in the European Theater. It states:

"By working diligently over long periods of time, this organization rehabilitated hundreds of miles of railroad, thus enabling the continuance of an expeditious and efficient flow of supplies to the armies in the field. The tireless efforts, ingenuity and technical skill demonstrated by personnel of the 347th Engineer General Service Regiment were in keeping with the highest traditions of the armed forces of the United States."

The 347th Regiment remained on occupation duty in Germany until it was inactivated in June 1946. It was reactivated in the Organized Reserve a year later, with headquarters at Salt Lake City, UT, where it remained until it was inactivated again in March 1949.

On 25 October 1954, the unit was redesignated as Headquarters and Headquarters Company, 18th Engineer Brigade, and activated as a Regular Army unit at Fort Leonard Wood, MO. The unit remained at Fort Leonard Wood until it was inactivated again in March 1963.

The 18th Brigade was reactivated in July 1965 and deployed to Vietnam two months later. It was inactivated in Vietnam in September 1971 after receiving four Meritorious Unit Commendations for support of military operations.

The 18th Brigade was reactivated from elements of the former 24th Engineer Group (Construction) in October 1977 at Karlsruhe, Germany, where it is presently headquartered.

MISSION AND ORGANIZATION

Today the 18th Engineer Brigade is the only Combat Heavy engineer brigade on active duty within the United States Army Europe (USAREUR). Its peacetime mission is: to maintain combat readiness; to manage and execute the USAREUR Troop Construction Program; and to provide topographic support in Theater. By maintaining a high state of combat readiness, the Brigade is prepared to accomplish its wartime mission, which is to provide a full spectrum of engineer support for all U.S. forces in Southern Germany to the rear of the Corps' rear boundaries.

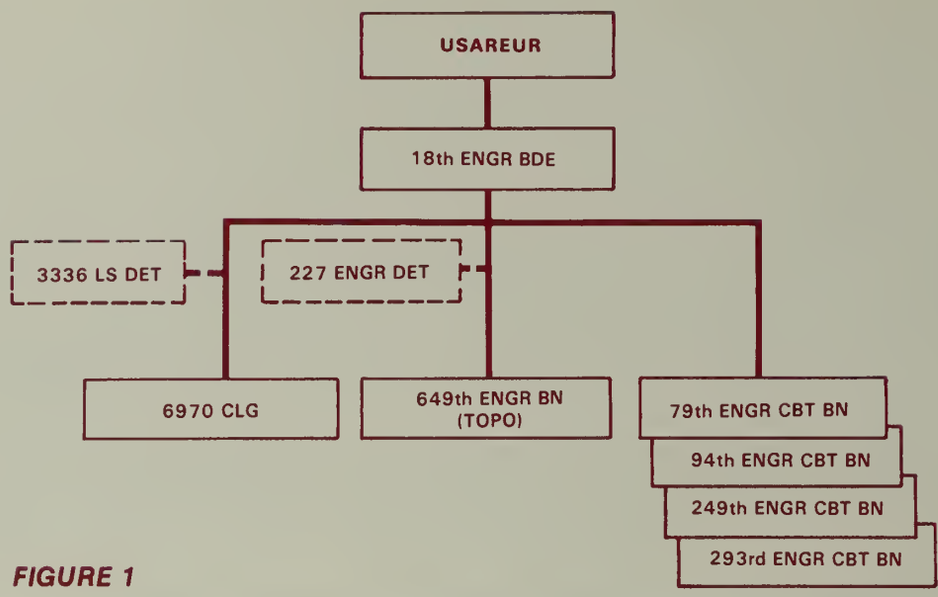


FIGURE 1

The 18th Brigade is considered a USAREUR engineer asset and is organized for its peacetime mission as shown in Figure 1. The organization consists of four Combat Heavy battalions, a Topographic battalion, and a Civilian Labor Group (Engineer Construction). Brigade Headquarters contains Labor Service Liaison and Topographic Detachments which provide Brigade-level planning and control for the Civilian Labor Group and the Topographic battalion. Authorized Brigade strength is approximately 4,200, including about 1,000 Labor Service employees.

Brigade capabilities are significant and represent a major contribution to USAREUR's wartime mission and its peacetime activities. Its peacetime contributions include construction support of the USAREUR quality-of-life and combat readiness goals, as well as topographic support. Wartime contributions would include construction and combat engineering tasks. Brigade capabilities are shown in Figure 2.

PEACETIME ACTIVITIES AND COMBAT READINESS

Peacetime activities of the 18th Brigade are tailored to maintain unit combat readiness and soldier skills. Missions are translated into specific tasks; tasks are further defined in terms of training objectives, and prioritized; and appropriate time is allocated to schedule training, which includes combat engineer and individual soldier tasks, and the USAREUR Troop Construction Program.

Combat engineer and soldier training is

CAPABILITIES

20 VERTICAL CONSTRUCTION PLATOONS
13 HORIZONTAL CONSTRUCTION PLATOONS
3 HEAVY EQUIPMENT PLATOONS
18 GENERAL CONSTRUCTION PLATOONS

SPECIAL OPERATIONS (CLG)
- ASPHALT PAVING
- CONCRETE PAVING
- CONCRETE BATCH PLANT

TOPOGRAPHY
- MAPS
- TERRAIN ANALYSIS
- TERRAIN SURVEY

FIGURE 2

performed at home station, local training areas, major training areas, and in major field training exercises, such as REFORGER. Participation in the Troop Construction Program provides valuable experience for the Brigade's construction specialties. The quality and quantity of training provided by troop construction projects could not be gained without the financial assistance of the USAREUR construction accounts. In addition, construction is accomplished to support NATO activities and the Air Force.

USAREUR derives two prime benefits from the Brigade's Troop Construction Program. First, it enhances Brigade combat readiness. Second, it provides new and improved facilities (approximately $9 million worth in FY 78).

Due to the shrinking value of the dollar in placing European construction and the resulting savings from troop construction, the Brigade will be engaged to a greater extent with MCA horizontal construction projects in the future. To complement the previous capability for asphalt paving, the Brigade recently procured a concrete paving train. The addition gives the Brigade a full range of equipment to accomplish horizontal construction projects. Vertical construction will continue to have a high priority.

Skills gained in the Troop Construction Program and the ambitious combat engineer training program prepare Brigade personnel to provide reliable support to USAREUR in peace and war.

Yet another peacetime activity which contributes to combat readiness is participation by the Brigade and its subordinate units in the "Partnership Program" with German Army units. Participation in joint training exercises and social events provides valuable interoperability experience.

Minefield Approximate Grid Indicator Coordinates

A fast, simple alternative method of reporting the location of enemy minefields

by LTC Bruce W. Baumann

Current U.S. tactical doctrine emphasizes mobility and maneuverability in conducting the active defense. Since the enemy is certain to use mines extensively in both offensive and defensive operations, we must be able to detect and breach minefields with a minimal loss of momentum and by using the least amount of breaching resources.

The active defense requires that maneuver units, engineers, and other supporting units rapidly detect mined areas in order to maintain mobility to concentrate, or to move laterally and occupy successive battle positions throughout the covering force area and the main battle area. Without all-source capabilities for detecting minefields and rapidly communicating information to maneuver commanders, the traditional detection of mines by tactical encounter—soldiers stepping on mines or vehicles running over them—will continue.

In order to provide the maneuver unit commander with the flexibility to conduct a bypass, or with the time and distance to prepare for breaching operations, the location and size of an enemy minefield must be reported to the next higher command at once. Current procedures for reporting enemy minefields are listed in FM 20-32, Mine/Countermine Operations at the Company Level. They require the unit locating the minefield to submit the following data:

- Map sheet designation;
- Date and Time of collection of information;
- Type of minefield;
- Coordinates of minefield extremities;
- Depth of minefield;
- Enemy weapons or surveillance;
- Estimated time to clear minefield;
- Estimated material and equipment needed to clear minefield;
- Routes for bypassing minefield (if any);
- Coordinates of lane entry;
- Coordinates of lane exit;
- Width of lanes, in meters;
- Other information such as types of mines, new mines, boobytraps, etc. In addition, the reporting unit is required to mark the minefield and record it on the standard Minefield Record (DA Form 1355).

The process of encoding and transmitting the enemy minefield report is time consuming and susceptible to errors of information. An alternative method of reporting the approximate location of enemy minefields over radio or telephone without transmitting a series of grid coordinates and without encoding the message is known simply as "MAGIC," an acronym for Minefield Approximate Grid Indicator Coordinates. The MAGIC protractor consists of a template marked with various numbered shapes. The center of the template is indicated with a cross, while the perimeter is segmented into degrees.

Use of the MAGIC protractor requires the following steps:

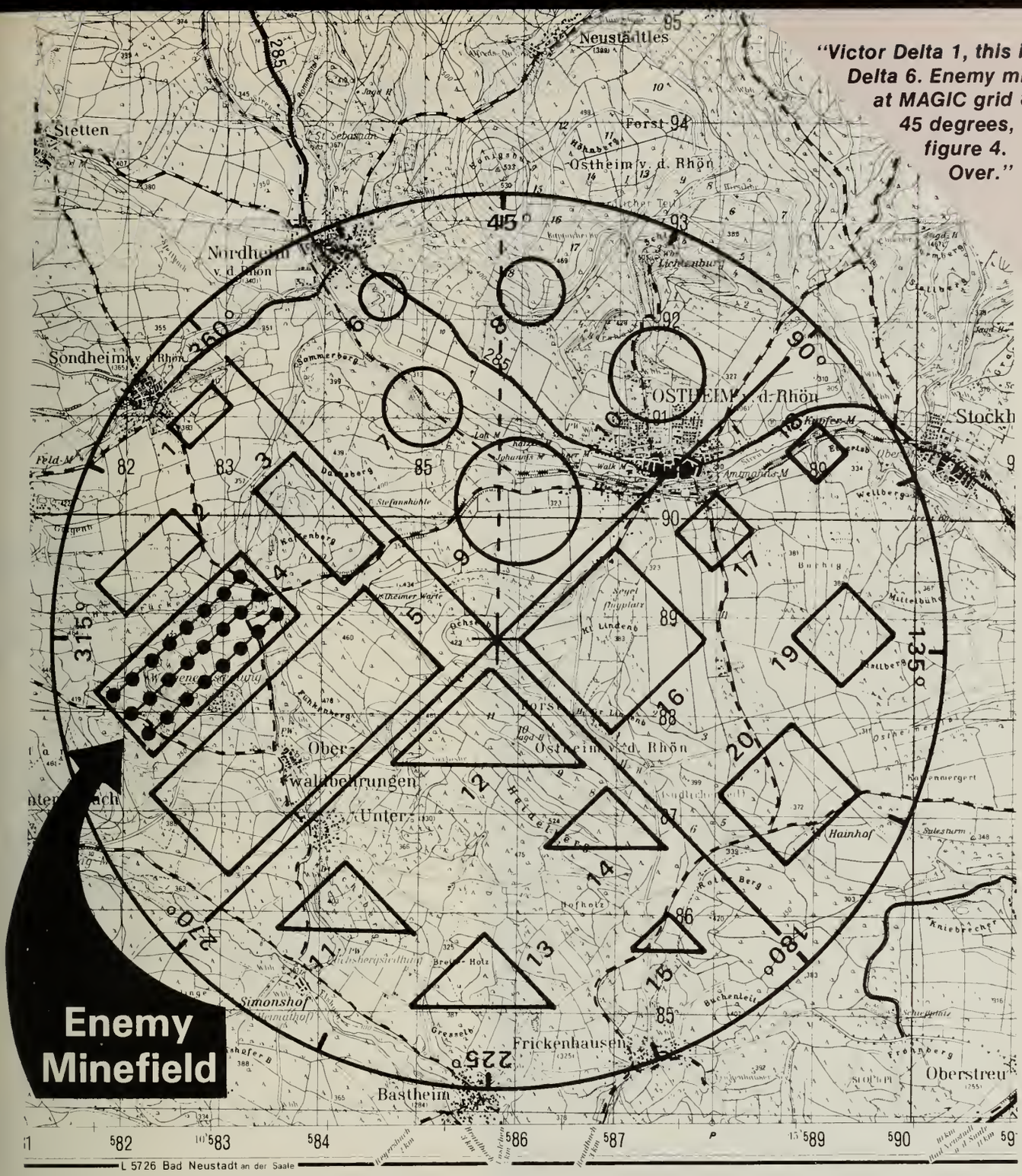
(1) Place the MAGIC template on the map, and over the plotted enemy minefield so that its boundaries fall within one of the appropriate shapes;

(2) Read the grid coordinates from the center of the MAGIC template, not from the center of the enemy minefield;

(3) Read the bearing in degrees where an imaginary line running grid north from the center of the template cuts the perimeter of the protractor;

(4) Transmit the message giving the grid coordinates, the bearing, and the shape number. Encryption of the message is not required, since enemy information is being reported.

The MAGIC method of reporting enemy minefields is currently employed by all engineer units of the First British Corps and some engineer units in the U.S. Seventh Army, both stationed in the Federal Republic of Germany. It is included in the Field Standing Operation Procedures of both units and is employed during their field training exercises.



"Victor Delta 1, this is Victor Delta 6. Enemy minefield at MAGIC grid 858888, 45 degrees, figure 4. Over."

MAGIC template has been placed on map so that minefield falls within boundaries of appropriate shape

The MAGIC concept should be evaluated by all combat, combat support, and combat service support units as a rapid method of reporting the location and size of enemy minefields. Ultimately, it should be included in the next revision of FM 20-32.

LTC BRUCE W. BAUMANN is the Senior Projects Officer, Concepts and Studies Division, Directorate of Combat Developments, U.S. Army Engineer School, Fort Belvoir, VA.

The Total Force

A look at the organization and objectives of our Reserve Components

by CPT Barry D. Willard

Many Active Army personnel are not familiar with either the force structure that exists in CONUS for the support of the US Army Reserve (USAR) and Army National Guard (ARNG) or what these units do during the course of a training year. The system uses the CONUS-based Army as the foundation with Army Readiness Regions (ARR) assigned to cover geographic areas within the Army area. The ARR is further subdivided into Readiness Groups to facilitate support of both USAR and ARNG units within the Region areas. The current force structure contains nine Readiness Regions that cover the 48 continental states and Puerto Rico (figure 1).

Combined Arms Training for the Reserve Components

More realism, higher morale, and improved readiness are possible

by LTC William I. Travis

Training with other units adds a high degree of realism, provides appreciation for other units' capabilities, increases unit morale, and improves the readiness posture of all units involved. Training activities of the 972nd Engineer Battalion (Combat) (Corps), U.S. Army Reserve, during the period from October 1977 through October 1979 demonstrates the benefits of such training.

OCTOBER 1977 MUTA-5

The 972nd Battalion conducted mutual support training at Camp Atterbury, IN, with elements of the 1st Squadron/238the Armored Cavalry, Indiana National

The Active Army advisors at the Readiness Groups are assigned to Branch Assistance Teams (BAT) or to Functional Teams. In ARR VI the "dedicated unit advisors" are generally assigned only at brigade level and higher except in certain instances where a unit is in an isolated part of the state or is designated as a "high priority" unit. The battalion advisor slots of several years ago are being phased out by attrition and new personnel are being maintained on the BAT at the Readiness Groups. The units cited as exceptions will maintain their unit advisors under current plans.

The USAR and ARNG units themselves are different in their internal command and control networks. The USAR units are assigned to Army Reserve Commands or General Officer Commands which serve as a vital link in their chain of command. The ARNG units belong to the state in which they are stationed and are in many instances structured along traditional lines in brigades and divisions. The missions of these units vary as much as the different branches they represent. Within the scope of the Reserve Components (RC) every branch is represented and expected to maintain its individual as well as its unit proficiency. In addition to their FORSCOM training objectives, the ARNG units also train to perform state missions relating mostly to state-wide or local emergencies as designated by that state's governor. USAR combat arms units are assigned to armories in battalion size in cities that can support a unit of battalion strength. This can and does present problems in recruiting especially if more than one USAR unit is located in the same metropolitan area. Generally speaking, ARNG units have smaller recruiting areas population-wide and are traditionally linked with the area in which they are located.

The first visit to a Reserve Component unit by an advisor fresh from an active duty battalion assignment can be an eye-opener. It is important not to develop first impressions of a unit without seeing the unit as a whole. To an officer fresh from the European environment where motor pools and work areas must be maintained in almost "spit and polish" condition, that first visit to a Reserve Component motor pool, where maintenance is carried out by a few civilian technicians on a continuing basis, can be unnerving.

Guard. Training activities included preparing, defending, and testing defensive positions and obstacles. The 972nd defensive position was attacked by the Cavalry Squadron, thus providing realism and motivation to engineers preparing their positions. Each platoon position was critiqued by Readiness Region personnel.

An antitank ditch and log crib were also constructed to determine their effectiveness. During the test, a tank attempted to cross the ditch and overrun the log crib. Engineers and tankers alike learned that a well-constructed log crib will withstand three rams of a tank and that antitank ditches significantly decrease tank maneuverability.

JUNE 1978 ANNUAL TRAINING

The 972nd conducted mutual support training with the 142nd Field Artillery Group, Arkansas National Guard, at Fort Chaffee, AR. Firing positions for the Artillery Group were prepared by the 972nd. The Artillery Group commander critiqued the positions, after which artillery personnel fired their weapons. Artillery personnel also gave the engineers an orientation on artillery weapons and instruction in artillery fire adjustment.

Most engineer personnel were airlifted back to garrison at the end of the four-day FTX by the 536th Air Company, Texas National Guard. Helicopter personnel also instructed engineers in loading and unloading procedures.

In addition, all engineer NCOs received a 12-hour block of instruction on coaching and counseling techniques designed for retention counseling and improving personal communications. Instruction was provided by a US Army Reserve School instructor who conducts similar management seminars in his civilian profession.

NOVEMBER 1978 MUTA-5

Engineer squads conducted pinpoint minefield and target folder tasks while masked and operating under smoke cover provided by the 224th Chemical company, USAR.

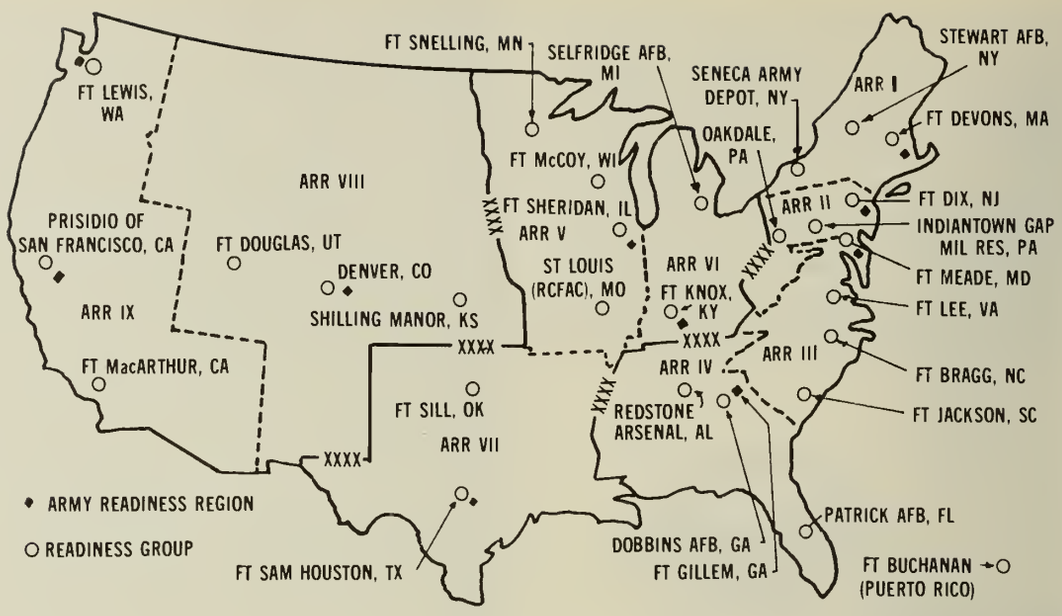


FIGURE 1

But seeing what can be accomplished and the excellent condition of most of the vehicles, it is evident that "eye wash" in the motor park is not necessary to maintain equipment. Some active units could take lessons on vehicle maintenance from this small group of dedicated technicians who do not, as a rule, have much assistance except on drill weekends. A full-time administrative-supply technician (AST) keeps the armory operating on a day-to-day basis. An ARNG technician holds a position in the unit for which he works; a USAR technician must be a member of a USAR unit but not necessarily the one for which he works as a technician.

Units must complete 48 hour-drills or approximately 24 days during the year plus a two-week annual training session. In addition, there are some extra pay periods allocated to the unit commanders that permit preparation for training assemblies and trips to Active

APRIL 1979 MUTA 4

The 70th Training Command, 70th Training Division, Indiana Army Reserve, provided instruction, supervision and facilities for the Engineer Battalion's annual weapons qualification and familiarization training, including M16, M203, M60, and Dragon Missile training. Medical support was provided by the 337th General Hospital, Indiana Army Reserve.

MAY 1979 ANNUAL TRAINING

The 972nd and the 652nd Float Bridge Company, Wisconsin USAR, provided mutual support during annual training at Fort McCoy, WI. The 652nd operated M4T6 Class 60 rafts to cross engineer personnel during a tactical night relocation involving a night river crossing operation. Much prior planning and preparation by both units went into the operation, which required two nights to complete. It was the first time either unit had conducted a night tactical river crossing.

972nd Engineer Battalion personnel offload from helicopter provided by the 536th Air Company, Texas National Guard

Army installations for coordinating site training, field training exercises, etc.

The quality of a unit's training during the year is put to test each year at annual training (AT) during a two-week period, normally during the summer, although many RC units conduct winter AT now at Camp Ripley, MN. The USAR unit is evaluated by Active Army evaluators, and ARNG units are evaluated by personnel designated by Headquarters, FORSCOM. The advisors from the Readiness Groups accompany the units to assist in their training prior to evaluation. The association between the Reserve Component unit and the Active Component (AC) unit is beneficial for both units. The assistance provided by the AC unit benefits the RC unit and complements the training conducted at AT. Additionally, the active duty soldier sees that a unit manned by what he has been led to believe are "weekend warriors" can be just as professional as any active duty unit, sometimes more so.

What does an RC unit do during the year at its home armory? Normally after the annual training, which in fact amounts to a unit mobilization, about two or three drill periods are required to get the unit's equipment back in condition for the remainder of the year. Also during these periods, training is organized by the battalion for the coming year. Since this yearly training is scheduled in advance, post-AT training will reflect what was determined by the evaluators as weak or strong points in the unit. In some instances, training will continue to increase individual proficiency to higher levels and attempt to correct noted deficiencies in the past year's training. In this respect the advisors of the Readiness Groups can play a vital role if the unit recognizes this source of assistance.

The Readiness Group BATs have a variety of experience and skills available on-call to the RC commander. Unfortunately many RC commanders look on the BATs as inspectors, not assistors, and hesitate to call on them. Regardless of the branch of a particular unit, teams to assist in any area can be obtained through the BAT for that particular unit. For example, if one of our Field Artillery or Air Defense Artillery units needs assistance in a specific area, lets say, files management, the BATFA coordinates with the members of the Functional Administrative Team to visit the requesting unit either during the week or during a drill period (whichever is more convenient for the unit) to give whatever assistance is needed. This goes for all assistance teams in a Readiness Group. This assistance runs the gamut of everything from going through a first sergeant's duty roster (to make sure he is aware of all the current policies) to conducting formal classes and field training in preparing an artillery battery for the delivery of fire. Once the RC commanders realize that the Readiness Group advisors are not "they" from higher headquarters, but are capable and interested in readiness, the overall readiness of both USAR and ARNG will increase.

All in all, with approximately 190,000 men and women in the USAR and 365,000 in the ARNG, it can readily be seen that the "total force" can make the difference in a future conflict.

CPT BARRY D. WILLARD is a Branch Assistance Team advisor, assigned to Headquarters, U.S. Army Readiness Region VI, Fort Knox, Ky.

OCTOBER 1979 MUTA 5

The 972nd combined efforts with the 122nd Tactical Fighter Wing, Indiana Air National Guard, and the Helicopter Attack Troop, 107th Armored Cavalry Regiment, Ohio Army National Guard, at Camp Atterbury, IN. The vulnerability of ground troops to air attack, and the need for camouflage, dispersement, and air defense was vividly demonstrated by low-level air attacks on a 972nd convoy by F-4 jet fighters and helicopters.

OTHER TRAINING

972nd platton leaders and platoon sergeants receive extensive instruction by Readiness Region personnel during Tactical Exercises Without Troops (TEWTs) prior to every FTX. In addition, the 972nd receives periodic finance and administrative assistance from the 425th Personnel Service Company and the 412th Finance Company, Indiana USAR.

LESSONS LEARNED

The key lessons learned by personnel of the 972nd Engineer Battalion, in conducting mutual support training with other Reserve Component units, include the following:

- Mutual support training is economical, requiring very little, if any, additional funding;
- ARTEP tasks should be selected which are mission-related for all participating units. Careful selection of tasks helps to insure a high degree of realism;
- Advance planning and coordination is absolutely essential. Each unit must evaluate training objectives, and coordinate with the other units to insure that training plans of each unit mesh;
- Simplicity is the key to successful mutual support training. Emphasis should be placed on basic, well-defined tasks which can be easily controlled;
- Commanders must use initiative in contacting commanders of other units near their Annual Training or Inactive Duty Training site.

CONCLUSION

In summary, the 972nd has found that training with other Reserve Component units adds a high degree of realism, provides appreciation for other units' capabilities, has a positive impact on unit morale, and improves the readiness posture of each participating unit more so than if each unit trained individually. The 972nd Engineer Battalion has adopted the motto "Where the Action is," and mutual support training has helped us live up to it.

LTC WILLIAM I. TRAVIS is the commander of the 972nd Engineer Battalion (Combat) (Corps), 372nd Engineer Group, U.S. Army Reserve.

a new look in

TOPOGRAPHIC SUPPORT

by COL Daniel L. Lycan & Val E. Sellers

New concepts pave the way for the first major change since World War II

Historically, winners of military campaigns, from Hannibal's unexpected crossing of the Alps during the Punic Wars to General Robert E. Lee's classic troop movements during the Civil War, have attributed much to their success to a superior knowledge and use of the terrain. Prior to the 20th century, however, most military tactical decisions were based on the commander's personal reconnaissance of the terrain or upon information obtained from scouts. For the most part, maps were rudimentary, even nonexistent.

The first major conflict of the 20th century witnessed the extensive use of maps by our allies in tactical operations, precluding the necessity for American forces to engage in large scale engineer intelligence activities. By war's end, however, three topographic battalions had been deployed with the General Headquarters of the American Expeditionary Forces. Each battalion engaged in the preparation of battle maps by overprinting existing base maps with enemy dispositions.

Prior to the beginning of World War II, U.S. military leaders recognized the potential scope of the forthcoming conflict and developed a modern, well-equipped mapping establishment with world-wide responsibilities. U.S. topographic units had been reorganized between the two global conflicts so that, during World War II, topographic support in the field was provided by a base topographic battalion, an engineer topographic battalion (Army), and corps company. In addition, direct operational control of engineer intelligence functions, including mapping, had been transferred to the chief engineer of each theater.

During the war, field units multiplied, acquired improved instruments, and matured in efficiency and reaction time. The Engineer Reproduction Plant was renamed the Army Map Service (AMS), moved to a new location, and dramatically increased its production. Collection activities and the library of foreign maps were also expanded. When the war ended, field units became miniature base plants, utilizing advanced technology to increase accuracy and improve rates of production. The Army Map Service continued to expand in all areas and increased its international mapping activities.

During the Korean conflict, the old Japanese Imperial Land Survey maps of Korea were converted and revised in record time. During the days of the waning French influence in Indochina, initial overall medium-scale mapping was produced in a matter of months. During the Vietnam conflict, the initial mapping effort was done by a field unit in Asia which had matured into a base plant organization that implemented international mapping agreements and expanded its capability through commercial contracts; however, the Army Map Service subsequently regained dominance by producing numerous revised editions to maintain current coverage of the war zone.

Technology was not idle during these years, and advanced topographic instrumentation and data acquisition systems were developed. However, they were too sophisticated to replace worn out and obsolete equipment used by field units. By the mid 1960s, studies indicated that a new concept of operations would more effectively fulfill the need of Army commanders in tactical situations. The new concept supported the view that basic general purpose mapping could be accomplished more effectively by using the advanced capabilities of military mapping centers in the United States. It was also recognized that detailed on-site information available to field units should be incorporated into maps provided to them.

On-site topographic information, which exists in general forms, is most useful in graphic form. Thus, a separate graphic for each individual terrain element (factor) affecting military operations should be prepared. When accomplished at the lowest level, individual factor overlays are combined to assist the military geographic intelligence specialist in making rapid analyses of the effect of terrain on tactical military activities. A good example of this approach is the problem of cross-country tank movements. By weighing existing terrain conditions against the degree of slope tanks can climb, the size of trees they can knock down, the spacing of trees required for passage, and the ground pressure they exert, a specialist can quickly and accurately delineate areas of relative mobility. The completed cross-country movement data can then be overprinted on a standard topographic map in a distinctive color, and produced in sufficient quantities for use by planners, unit commanders, and tank operators.

The ideal way of implementing such a concept is to have on-hand a data bank of various factors in graphic form. However, since there are so many factors that have the potential to affect military operations, the cost of preparing such a worldwide data bank is prohibitive. Therefore, the initial task of field topographic units will be the creation and maintenance of a data base of factors pertinent to their particular areas of deployment. From this data base, field units will be able to produce mission-oriented graphics rapidly in response to requests.

The effective use of this new approach depends upon the degree of improved communication between tactical unit commanders and the command and control elements of topographic units. Rather than depend upon G-2 or S-2 sections of tactical units to obtain maps for planning and operations, procedures must be established to keep topographic units aware of planned operations and anticipated problems. Destinations, required travel times, and the nature and number of vehicles are examples of pertinent information that should be considered in order to guarantee timely production of the best possible topographic support products.

Doppler positioning equipment permits a high degree of accuracy in determining three-dimensional positions of points on the earth's surface

To paraphrase the poet .philosopher Santayana, those who refuse to heed the lessons of history are doomed to repeat it. The new topographic support system is actually a modern refinement of the Army's topographic support system at the end of World War I. Allied maps in existence at the onset of World War I can be compared with the current holdings and production capability of military mapping centers. The modern concept of mission-oriented supplementary graphics overprinted on basic general purpose maps can be considered a sophisticated follow-on of the battle maps of the First World War. The interim phase, when Base Topographic Battalions evolved into mini-base plants, has been abandoned due to a lack of mobility and technical difficulties experienced in producing field-hardened versions of highly complex instruments used in modern map production plants.

To fulfill requirements of the new concepts, fundamental changes have been made in the organization of field topographic units. First, they will work from the basic family of products produced by various U.S. military mapping centers and will not participate in original mapping. Second, and probably most significant, they will incorporate the military geographic information functions as inherent parts of their organizations. Since World War II, these functions have been performed by separate terrain intelligence detachments.

From the management viewpoint, the headquarters element of the newly organized topographic battalion will be expanded to include technical experts in the

Using data generated in military mapping centers, the operator can determine position and elevation of any point of interest on the data base photographs. Points of interest on reconnaissance photos can be transferred to the data base

field of surveying, cartography, photogrammetry, military geographic information, and reproduction. This technical staff will know the status of the current workload and data holding in each technical subsystem. Thus, when a request for topographic data to support a tactical operation is received, these technical experts will be able to propose alternative topographic products or services, along with estimated response times, that will meet the tactical commander's needs.

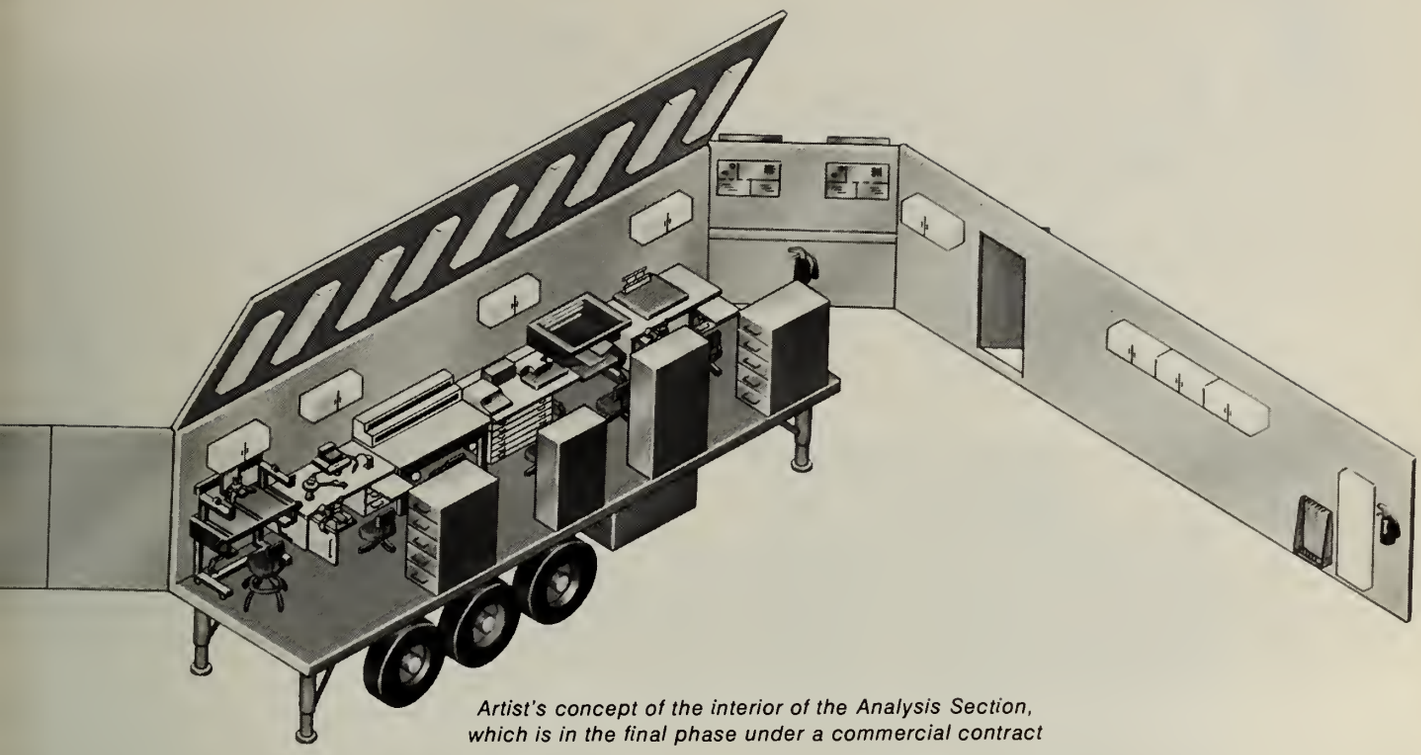
To implement the new concepts, the topographic battalion will be furnished with a modular, mobile and evolutionary topographic support system: modular, to permit variations of configuration as a function of the physical environment and combat situation; mobile, to maintain contact with tactical forces at the lowest possible echelon; and evolutionary, to keep pace with advancing technology.

The surveying section will include a point positioning capability based on classical, analytical photogrammetric techniques. This is another example of utilizing the extensive technical capabilities of U.S. military mapping centers to assit field operations. In these centers, blocks of photographs are measured, and the absolute position and orientation of each individual exposure is determined. The results are expressed in matrix form on magnetic tape, which can be used in a small desktop computer. A simple stereoscopic measuring system is used to determine photographic coordinates of unknown points on two different exposures, which are converted to ground coordinates by using the absolute orientation matrix. Data bases of photographs and their associated orientation parameters are prepared routinely for field users. In addition, ground equipment that uses satellite signals to determine absolute ground position is included in the system. Modern, more conventional field instruments, including those which combine optical angle measuring with electronic distance measurement, are included as insurance for the more sophisticated instruments.

The cartographic revision section will prepare final drawings and reproduction materials for special purpose graphics, draft and revise drawings of individual factors used for the preparation of special purpose products, and prepare reproduction material for the interim revision of general purpose products. Three types of equipped vans can be deployed in a variety of combinations to provide sufficient work areas and items of equipment to accomplish any cartographic operations required. There is nothing radical in the types of equipment, since the final rendering of graphics will remain a manual operation. However, the most advanced commercial products will be used throughout.

The old workhorse—the reflecting projector—will be replaced by a modern stereo zoom lens transfer instrument, which in addition to duplicating the scale change parameters of the reflecting projector, has a controlled distortion capability to improve the fitting of details on reconnaissance photographs to the maps being revised. Production will also be increased by the introduction of coordinatographs for the preparation of grids and projections.

The major source of data for the cartographic revision team will be the military geographic information analysts. Formerly, small detachments operated out of tents to gather data; now data are gathered by a group of 25 specialists working out of five different vans. Four vans, dealing with collection, analysis, synthesis, and information storage, will be deployed with the main body of the battalion, while the fifth will be truck-mounted for increased mobility, and will be deployed for direct support at lower echelons, typically at division level. The direct support group will, as the



Artist's concept of the interior of the Analysis Section, which is in the final phase under a commercial contract

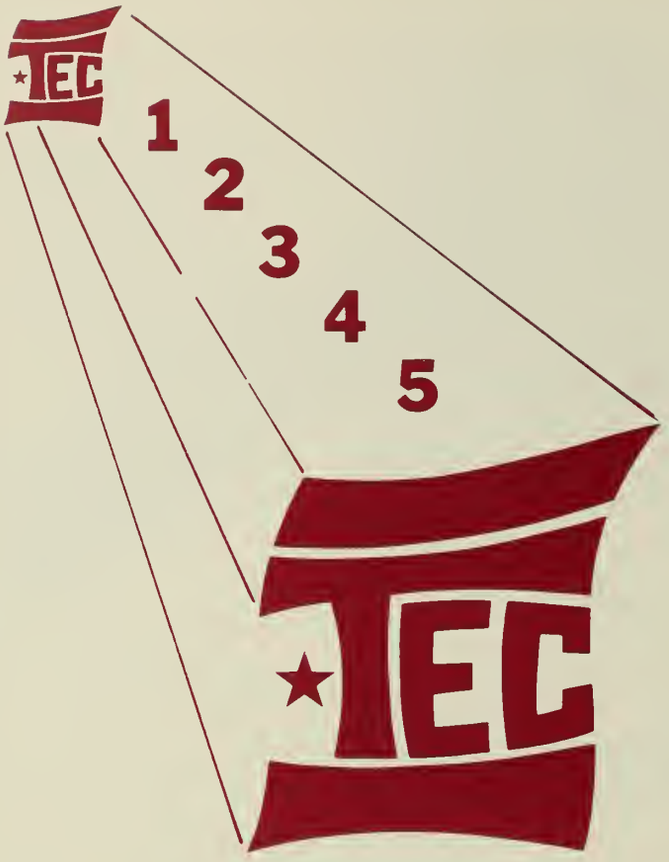
name implies, interface directly with tactical units, dispensing as well as gathering data. Analysts will continually convert new data to a graphic format to be sent back to the cartographers for final processing. Completed factor graphics will be stored in a separate storage and retrieval element, which will maintain holdings and send periodic notices to all concerned personnel, so that everyone knows what information is available.

Personnel and instruments for producing products based on photographs and other forms of continuous tone imagery will be consolidated in another group. Three different configurations of vans are included. One van will house all photographic laboratory equipment, including printers and a frame rectifier. Another van will contain work areas and equipment to assemble photomaps and perform associated drafting. The other van will be used mainly for storage, but will also contain a duplicate of the analytical photogrammetric positioning system to generate control point coordinates for the subsequent rectification of photographs. Light tables, files, and miscellaneous items necessary for handling photographs will also be included. In practice, this element will prepare prints for interpretation by the analysts and will assemble or mosaic photographs to serve as a basis for hasty products requiring different scales or sheet lines than the standard general purpose products.

The reproduction section is housed in several functional vans. To avoid difficulties caused by variations in temperatue and humidity, a separate paper-conditioning van has been included. Original copy will be processed in the camera van, which contains a 30-inch process camera. A layout section is provided to assemble and check incoming reproduction materials, and a photomechanical van will produce proofs or actual copies for distribution when the request is too small to utilize the press facility economically. All plate processing equipment will be in a single van. The combined capabilities of these sections will provide input to four press vans for high-volume reproduction. A finishing section, which will cut, bind, and wrap the completed products, completes the entire reproduction subsystem. A change from the previous organization is the elimination of reproduction material files. These are maintained in the storage and retrieval section, which will also maintain the completed factor graphics and film library. Thus, reproduction materials will be available, together with other graphic and imagistic data, to all functional subsystems.

The major thrust behind this system development is to provide commanders of tactical topographic units with an improved capability as soon as possible, so they can increase their support for commanders of combat units. To achieve this, only commercially available and reliable items of equipment are being included in the system. Parts of the reproduction subsystem have been fabricated and subjected to preliminary tests by topographic troops. Components of the remaining subsystems have been selected and preliminary layouts have been prepared in anticipation of a commercial fabrication contract early in 1980. The first complete system is expected to reach field units in Europe in early 1982. At that time, the new look in field topographic support will be a reality—the first major change since World War II.

COL DANIEL L. LYCAN is commander and director of the U.S. Army Engineer Topographic Laboratories, Fort Belvoir, VA. MR. VAL E. SELLERS is a project engineer at the Topographic Laboratories. He is assigned to the development team for the Topographic Support System described in this article.



5 Years Later

A significant aid to the improvement of individual efficiency and unit effectiveness

by MAJ Charles F. Hanselmann & Jerry Perlmann

In 1971, the U.S. Army Board for Dynamic Training identified a critical need for a type of instruction geared to the needs of the individual soldier after he has finished his initial formal military training. After three years of research and development, the Training Extension Course (TEC) Program was introduced in 1974. TEC lessons were originally designed to assist in upgrading and maintaining MOS skill proficiency for combat arms soldiers. They are prepared by service schools to train individuals in the Active Army, Reserve Components, and Army-related activities such as ROTC.

TEC is an alternative to traditional group instruction where the soldier is required to participate regardless of qualifications and knowledge. The philosophy of performance-oriented training, training objectives, standard go/no-go testing, and validated lesson development is part of the overall TEC system. TEC is a vehicle for communicating critical "how to" principles, techniques, and methods of MOS/job performance training, while providing validated materials to train both individual soldiers and units.

TEC is closely integrated with and supports the Enlisted Personnel Management System (EPMS), the Soldier's Manuals, Skill Qualification Tests (SQT), and the Army Training Evaluation Program (ARTEP).

During the lesson development process, each TEC lesson is tested (validated) using soldiers from the lesson's target audience. If members of the test group fail the pre-test, the lesson is redesigned and retested until a representative sample of the target group can achieve the objectives of the lesson as indicated by passing the post-test.

The first step in taking a TEC lesson is to read the Lesson Administrative Instructions (LAI). The LAI outlines objectives of the lesson and the skills required to take the lesson, and provides the pre-test. The Student Instruction Sheet (SIS) included with the lesson states objectives, materials needed, and time required. TEC lessons are standardized. The pre-test is designed to reveal a soldier's proficiency or lack of proficiency in his MOS. TEC tests are conducted in real-world situations to give the NCO or officer a tool to measure soldier proficiency or unit proficiency, and to prescribe appropriate training applicable. If a soldier can pass the pre-test he can proceed to more advanced training without taking that particular lesson.

TEC lessons are pre-packaged and soldier-tested for the critical tasks connected with each MOS. TEC employs the latest developments in educational technology: empirical design (based on experience or observation instead of theory), "hands-on" performance, lesson validation trials, and various methods of media delivery or lesson format.

Most TEC lessons are presented in an audiovisual format with a special projector. The film and sound are programmed to stop automatically to permit the student to answer questions or perform a task; then the student can reactivate the lesson. All TEC equipment can be powered by a standard field generator and transported in protective carrying cases. The projector can be used by one soldier at a time (with or without earphones) or by a small group of soldiers. TEC hardware works well with 10kw or higher a.c. generator power. Eight projectors are normally issued to each battalion size unit and a smaller number to separate companies or detachments. TEC lessons cost about $7,800 to develop and each copy costs about $3.00.

Lessons which are more appropriate for use in a field or motor pool situation (i.e. hands-on training) are developed in audio-tape format. A soldier can listen to the tape on a standard portable cassette player as it "talks him through" the lesson.

A third form of lesson material is the programmed text. This is usually a soft cover booklet with instructions outlining the objective, materials needed, time required, references, and other information. The text is often illustrated. Each printed lesson contains instructions, questions, and answers in step-by-step format.

All TEC lessons are self-paced and designed to be given under field conditions. Lessons may be used during duty hours, non-duty hours, or any combination of both. They are ideal for make-up or equivalent training, or split drills, and they can be reviewed while waiting at the rifle range or in a truck or a tent.

mastered before the soldier moves on to the next step. The student does not compete with others. If the student does not get the right answer the first time, he is encouraged to repeat the process.

A study completed by the Army Research Institute (ARI) in January 1978 concluded that TEC is more effective than conventional instruction. TEC-trained soldiers retain what they learn. Eight weeks after TEC instruction, they performed better than soldiers who were tested one day after receiving conventional instruction. During limited evaluation, TEC users scored higher on SQT than soldiers who did not use TEC.

In addition to being more effective than conventional training, TEC training costs 16 percent less. It gives more information in less time. It teaches soldiers to do their jobs better and trains them for new skills which increase their chances for promotion. Soldiers learn

AVAILABLE TEC LESSONS IN ENGINEER MOS

SUBJECT	APPLICABLE MOS	NO. LESSONS AVAILABLE
Universal Trestle Assembly M4T6 Fixed Span	12B, 12C	5
Combat Engineer—Obstacles & Barriers	12B	9
Float Bridge/Raft M4T6 Assembly	12B, 12C	14
Combat Engineering Concrete Construction	12B	1
Reconnaissance/Terrain Analysis	12B	11
Mine/Countermine Operations	12B	7
Mobile Assauit Bridge Operations	12B	12
Ribbon Bridge/Raft	12B, 12C	10
Bridge Anchoring Systems	12B, 12C	9
Water Sewage Specialist	51N	37
Mobile Assauit Bridge Repair	62B	33
Engineer Construction Equip Troubleshoot	62B	2

TEC helps soldiers prepare for their SQT (Skill Qualification Test). Critical tasks required for the individual's MOS proficiency are in the Soldier's Manual. TEC lessons mentioned in the manual will help the soldier achieve the desired level of proficiency. Each lesson is designed to train a soldier to perform critical job tasks. TEC is used in basic and advanced individual and unit training. In many instances, it has replaced the huge classroom with an interesting, interactive, and challenging alternative.

Instructors can provide good training without expert knowledge in every subject. A squad leader with minimum advance preparation can use a TEC lesson as a training aid by stopping the lesson to ask questions or discuss major points. TEC reduces instructor preparation time and increases management responsibility.

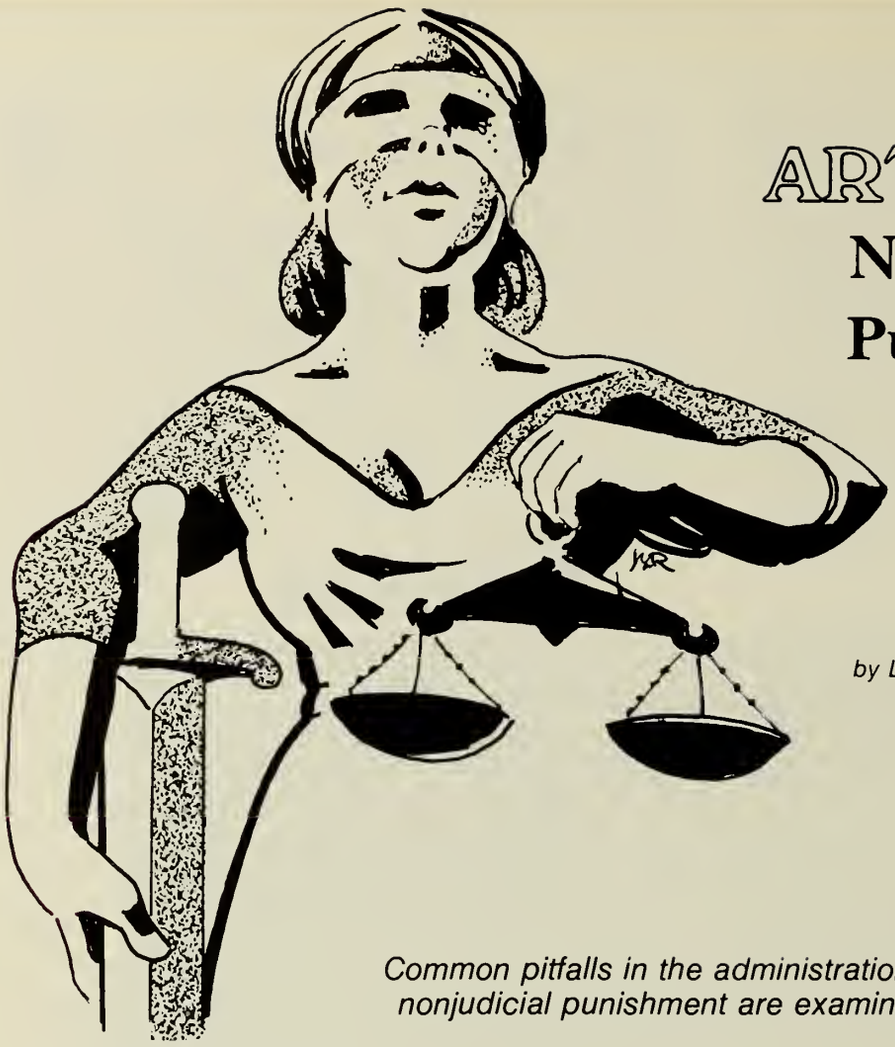
Experienced soldiers may complete a TEC lesson in 30 minutes, but time is unimportant if the soldier can pass the test. Lessons can be repeated as often as necessary to insure a high level of retention or as refresher training. After reviewing the lesson, a soldier is posttested to determine his skills in his own MOS. He may also study other MOS lessons. Each lesson must be

faster, retain longer, and have a higher degree of motivation when they control their own rate of progress toward training goals. And the best training is that which most closely approximates real-world conditions.

There are several reasons why TEC is not used more often. Some soldiers do not know how to use the material, or do not consider it important. A surprising number of soldiers do not know that TEC lessons are available at almost every Army unit world-wide, and others do not have access to lessons during off-duty hours.

A TEC Lesson Availability List is distributed quarterly to all TEC account holders. The point of contact for more information about the TEC program is the TEC Production and Distribution Office, Autovon 927-4868, Fort Eustis, VA 23604.

MAJ CHARLES F. HANSELMANN and MR. JERRY PERLMAN are assigned to the TEC Implementation Management Office, U.S. Army Training Support Center, Fort Eustis, VA.



ARTICLE 15
Nonjudicial Punishment

by LTC Steven Chucala

Common pitfalls in the administration of nonjudicial punishment are examined

Article 15 of the Uniform Code of Military Justice (USMJ) is one means available to the commander to correct undesirable behavior, administer punishment, and perhaps deter others from similar misconduct. Occasionally, it is improperly applied, resulting in a loss of confidence by subordinates in both their superiors and the military justice system. Such an unfortunate situation is created without malice by an unwary commander and it may innocently go undetected in the midst of day-to-day burdens of command.

This article presents six key areas which have historically been pitfalls in the administration of nonjudicial punishment. The information is of value to the commander, the accused, and the soldier at large.

CRIMINALITY

Article 15, UCMJ, concerns only acts of criminal conduct. As a simple rule, only acts recognized by the UCMJ as criminal may be the subject matter for nonjudicial punishment. Punishment of non-criminal conduct is not authorized by this proceeding. Additionally, care must be taken to insure that the crime applies to the accused soldier. An example of improper application is Article 133, UCMJ, Conduct Unbecoming an Officer, being applied to an enlisted member under the title of Conduct Unbecoming and Enlisted Man.

Another common mistake in Article 15 proceedings is the failure to state an offense. This commonly occurs when words of criminality or wrongdoing are omitted from the declared misconduct. Examples are such charges as "absent from place of duty" and "leaving the scene of an accident." In order to make these acts criminal in nature, words must be included in the charge that declare absence from a duty station or leaving the scene of an accident unlawful. Merely being absent from a place of duty is not criminal. Nor is leaving the scene of an accident a crime if you were simply a spectator.

To preclude such errors and to insure that acts of criminality are being disposed of, the offense should be in the form and language used for court-martial charges. Should the accused reject Article 15 punishment, the offense as written may then be used as the specification on a charge sheet with minimal effort.

JURISDICTION

In 1969, the Supreme Court of the United States, in *O'Callahan* v. *Parker,* prohibited military criminal jurisdiction over major offenses committed off post in the United States when no service connection is involved. The prohibition does not apply to *minor* offenses, which are generally defined as those punishable by confinement for one year or less. Accordingly, the exercise of Article 15 jurisdiction over offenses that cannot be prosecuted in military courts presents a serious matter for consideration by commanders. Close coordination with the local Staff Judge Advocate is recommended, since a soldier may reject Article 15 and request trial by court-martial, thereby eliminating the offense over which his

commander may exercise judicial disposition. A commander should be able to prefer charges and seek prosecution when confronted with a rejection of nonjudicial punishment. The inability to do so in a given case may adversely affect his disciplinary authority.

A similar situation occurs when a commander acts on a case supported only by evidence which would not be admissable in a court of law. Examples include evidence obtained by illegal search and seizure, incriminating evidence without a proper warning, and waiver of rights by the accused/suspect. Regardless of the type deficiency presented, an educated evaluation is required, and a decision should be made with potential consequences in mind. The prudent commander will determine the probability of sufficient evidence with which to forward a case to trial and, if it is lacking, not offer Article 15 to an accused.

INNOCENT UNTIL PROVEN GUILTY

The service member has the right to reject Article 15 and to request trial by court-martial. In most instances, the member accepts the Article 15, but his acceptance should not be construed as a guilty plea. It is simply an election of the forum which will determine the facts and, if guilt is established, impose punishment. This understanding is critical to the entire process and ties in with the accused's right to present evidence in defense, extenuation, or mitigation. The officer imposing the Article 15 must consider all evidence and determine guilt "beyond a reasonable doubt." Accordingly, acceptance of the Article 15 must not be treated as admission of guilt.

Similarly, it is improper to advise the service member of punishment to be administered before he makes his election and has the opportunity to present evidence. Such action demonstrates a predisposition toward guilt and punishment. Telling the accused of the specific punishment in mind is a method used by some commanders to urge acceptance of the Article 15 for a variety of reasons, including a weak or nontriable case. No matter how innocently committed, the impression and perception of a fixed frame of mind is presented to the accused and other personnel. Although the Article 15 officer may have thoughts about prospective punishment, those thoughts should not be communicated prematurely to the accused. However, the maximum punishment, in the event of a guilty finding, may be stated to the accused to help him determine whether or not to accept the Article 15.

SEE COUNSEL

The Article 15 officer must adivse the accused of certain rights, including his right to consult with an attorney of the Judge Advocate General's Corps. If the accused elects to waive all rights, the Article 15 officer may administer the Article 15 without delay. However, it is advisable to refrain from exercising the authority immediately, and to advise the accused to consult with an attorney and return within 72 hours. Thus, the appearance of perception that the accused was "railroaded" will be avoided.

Too often, the punished service member of an on-the-spot Article 15 returns to his comtemporaries and explains away his guilt by alluding to the action as an unfair proceeding when, in fact, he admitted his guilt and solicited immediate action. Despite a swift disposition of the case, the result may be an unspoken indictment of the military justice system and the commander by his subordinates. Consultation with a Judge Advocate attorney will permit the accused to receive proper advice. Issues of jurisdication and evidence will also be discussed to permit an intelligent consideration for either rejecting or accepting the Article 15.

APPEAL RIGHTS

Assuming the accused is found guilty and punishment is imposed, he has the right to appeal to the next superior commander in the chain of command of the Article 15 officer. Generally, 15 days is considered enough time for filing an appeal. The soldier receiving punishment should be aware of the implications of appealing punishment which restrains his liberty. For example, an unsuspended restriction for seven days which begins on the date of announcement will be served in its entirety if the appeal is filed on the 10th day. Should the appeal result in favorable consideration as to the restriction, the soldier will have already served the punishment and no recourse for relief is provided. However, if the soldier is aware that an appeal will postpone the imposition of restraint type punishment until appellate review is completed, it places the burden upon his shoulders to expeditiously exercise his appeal right.

The postponement of punishment until completion of the appeal process is known as "tolling the punishment." Tolling applies only to punishments of restriction, extra duty, and correctional custody. It does not apply to punishments such as reduction in grade, deferment of pay, and forfeitures since the punished individual can be made whole if the appeal is in his favor. The accused has basically three avenues of appeal: the appeal may be unspecified, that is, without a specific objection; it can be based upon his continued insistance of innocence; or, the accused may appeal on the basis that punishment is disproportionate to the offense committed.

EXTRA TRAINING VS PUNISHMENT

A soldier who cannot perform military tasks expected of him is lawfully expected to train until the duties can be performed satisfactorily. This training may occur during or after duty hours. However, extra duty for training must be normal training for the task deficiency in question. The commander and NCO must avoid prohibited punishments camouflaged as training or volunteer work, i.e. ordering a road march for soldiers with dirty weapons.

With one exception, all punishments must be incident to a formally recognized system, such as Article 15, UCMJ, and court-martial. The exception is on-the-spot corrections/punishments ordered during basic training.

The desire to punish off-the-record is real in view of the requirement that *all* Article 15 non-minor punishments become a permanent part of every soldier's Official Military Personnel File (OMPF). Accordingly, commanders and NCOs must comply with existing directives regardless of their desire to shelter a soldier. Limitations on extra duty for punishment, versus training, is declared in Change 5, paragraph 5-6, AR 600-20.

The proper administration of nonjudicial punishment and the avoidance of misconceptions and false perceptions by service members about the military justice system and the commander are just as important as correcting individual criminal behavior. A prudent rule-of-thumb is to perform all duties in a manner which sets an example for others to emulate. Although it may seem unlikely, the administration of an Article 15 exemplifies a commander's integrity, which, in turn, influences troop morale and discipline.

LTC STEVEN CHUCALA is the chief of the Command and Support Division, Department of Combined Arms, Directorate of Training, U.S. Army Engineer School, Fort Belvoir, VA.

OFFICER CAREER INFO

PROFESSIONAL DEVELOPMENT

Are the Army's needs for Military Engineers being fulfilled? What "tuning" of the Officer Personnel Management System is necessary to support these needs? How can we solve the professional development dilemmas confronting the Engineer specialty and further enhance its Combat Arms status? These are a few of the complex issues being addressed by a study task force comprised of officers from the Military Personnel Center, the Office of the Chief of Engineers, and the Army War College.

Initiated last fall as a result of concerns expressed by the Chief of Engineers, the group was charged with searching for viable career paths for engineers while recognizing the critical underalignment of engineer officers in grades 0-3 and up, the continued importance of success in troop unit positions, the increased demands for experience in the civil works area, and more emphasis on Professional Engineer registration. The study group is investigating parameters such as officer distribution plans, the centralized selection system, accession and retention of engineers, special career situations (topographic and aviation), and ongoing actions that would impact on the study (RETO, Division 86, DOPMA, and the DOD Proposed Retirement Plan).

The study group expects to formulate recommendations for consideration by the Chief of Engineers, MILPERCEN, and ODCSPER by June. The point of contact for further information is Major C. H. Dunn or Captain Dave Schnable at MILPERCEN (Commercial 202-325-0250/1/2 or AUTOVON 221-0250/1/2).

OER TRAINING PACKAGE

A self-study training package on the new Officer Evaluation Reporting System is now available. Known as AG Subcourse 15, it provides objectives, instructional material, and self-evaluations for the tasks involved for each member in the rating chain. A separate training package on the same subject has been developed for soldiers in MOS 75Z and 75D who are tasked with administering the new system. Both packages are available from the Army Institute of Professional Development; US Army Training Support Center; Newport News, VA 23628. Interested personnel should use DA Form 145 to obtain either package.

SENIOR RATER'S RESPONSIBILITY

The ability to draw upon the knowledge and experience of senior officers within each rating chain is a major feature of the new Officer Evaluation Report (OER).

This development will place greater evaluation and final review responsibilities on senior officers in a rating chain. These "senior raters," though removed from immediate supervision, will be acutely aware of unique organizational factors surrounding the rated officer's performance.

Increased organizational perspective and additional experience enable the senior rater to consider and compare a wide range of officers. At the same time, he is less likely to consider personality traits or personal relationships and rely more heavily on how an officer's performance fulfills the overall needs of the organization.

Reflecting the change in concept, the titles of the rating officials have been changed from rater, indorser, and reviewer to rater, intermediate rater, and senior rater. These changes aren't necessarily a one-for-one replacement for those previously used.

The rater is the first person designated in the rating chain and is usually the immediate supervisor of the rated officer. The senior rater is then selected according to the formula in Figure 1.

And both the rater and senior rater have been designated, if there is an intermediate level of supervision between them, an intermediate rater will also be designated.

As an example, in a typical battalion, company commanders would most likely rate their platoon leaders, with the battalion commander serving as the senior rater. For most platoon leaders, there will probably be no intermediate rater.

THE FORM

The senior rater's evaluation responsibility focuses on the rated officer's potential in comparison with a sample population of 100 officers of the same grade. This evaluation is recorded by placing an "X" in the appropriate box in the left-hand column of Part VIIa of DA Form 67-8 (OER) as shown in Figure 2.

While there are no quotas or rigid requirements placed on the senior rater's evaluation, logic imposes its own constraints on the number of officers who can be rated in any particular block. For example, it is extremely unlikely that all of the officers rated by a senior rater will always be one in a hundred. Therefore, the senior rater who consistently places all of his officers in the top box is distorting the system and simply not supplying the Department of the

FIGURE 1

RATED OFFICER	MINIMUM GRADE OF SENIOR RATER
Warrant Officer Second Lieutenant First Lieutenant	Major or GS-14
Captain	Lieutenant Colonel or GS-14
Major	Colonel or GS-15
Lieutenant Colonel	Brigadier General, or Colonel, or GS-16
Colonel	Major General, Brigadier General or GS-17
Brigadier General Major General	Senior to rater and Intermediate rater

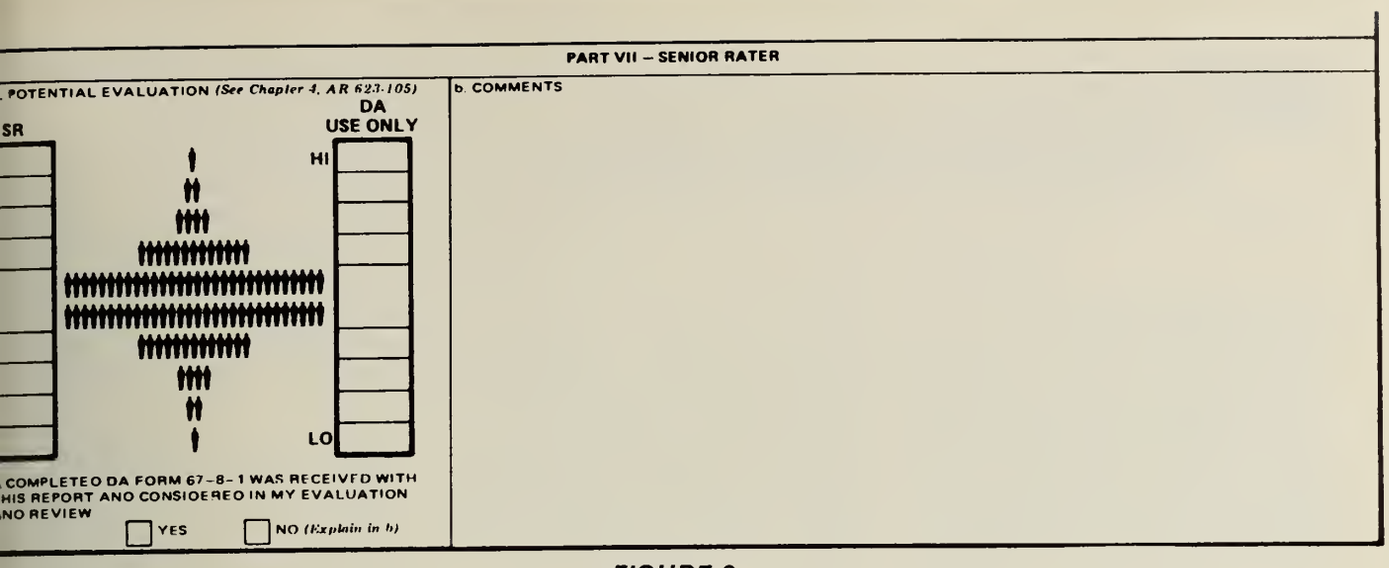


FIGURE 2

Army with credible rating information.

In making this evaluation, the senior rater uses all available means to gather information: his knowledge of the rated officer's performance, records, and information from other rating officials including their evaluations on the OER. Perhaps the most important source is the Support Form (DA Form 17-8-1), written by the rated officer himself and submitted to the rating chain. The senior rater indicates by checking a block in Part VII of the OER whether or not the Support Form was received and considered in the evaluation.

After evaluating the rated officer's potential, the senior rater reviews the entire OER and makes any comments on performance, potential, or any other pertinent points. The OER is then forwarded through the MILPO to MILPERCEN and the Support Form is returned to the rated officer.

THE RATING PROFILE

When MILPERCEN gets the OER, it adds a rating history or profile of the senior rater to the box in the right-hand column of Part VIIa. This profile shows exactly how the senior rater evaluated all the officers he had rated up to that time who were in the same grade as the rated officer. This profile enables selection boards and personnel managers to compare a given rating with the senior rater's general rating tendency. In doing so, the new system addresses the age-old problem of hard as opposed to easy raters. In addition, this profile will offer some protection to officers rated early in the new system in the event of general inflation later on in the life of the system.

The Senior Rater Profile Report (DA Form 67-8-2) is used to track the rating history of the senior rater at Department of the Army. The report will be prepared annually on senior raters who have rated at least five different officers. One copy of this record will be made available to the senior rater and another will be placed in his official military personnel file. This underscores the Army's commitment to the new OER by impressing upon officers the importance of their responsibilities as senior raters.

Assignment Officers

Pictured below are the Engineer Assignment Officers for the Active Army. From left to right, Lieutenant Colonel Art Williams, COLONELS (x7870); Lieutenant Colonel Ernest J. Harrell, LIEUTENANT COLONELS (x0423/4); Major Leonard W. Roth, MAJORS (x8108/9); Major John T. Lovo, CAPTAINS (x0650/1); Captain Robert J. Melchoir, LIEUTENANTS (x0650/1); and Chief Warrant Officer Aleck O. Fletcher, WARRANT OFFICERS (x7839). Telephone numbers have an AUTOVON prefix of 221 and a commercial prefix of 325 with Area Code 202.

COLONELS

LTC WILLIAMS

LT COLONELS

LTC HARRELL

MAJORS

MAJ ROTH

CAPTAINS

MAJ LOVO

LIEUTENANTS

CPT MELCHOIR

WARRANT OFFICERS

CW3 FLETCHER

ENLISTED CAREER INFO

NEW EER REGULATION

For the first time in its 20-year history, the Enlisted Evaluation Reporting System has its own regulation. AR 623-205, which became effective in January, is the new consolidated regulation that will govern the preparation and submission of enlisted evaluation reports. It replaces Chapter 8 of AR 600-200 and DA Pamphlet 623-1 and follows the same format as recently revised regulations for the Officer Evaluation Reporting System (AR 623-105) and Academic Evaluation Reporting System (AR 623-1). The new EER regulation was written to provide a single, easy-to-read, reference source for both individual soldiers and the managers of the Enlisted Evaluation Reporting System. The new reg consists of five chapters and three appendices.

E-3 PROMOTIONS

More E-3s can now be promoted because the Army has raised the ceiling on the number of E-4s within a command. Now, 70 percent of the total number of E-3s and E-4s assigned to a command may be in the grade of E-4. The previous limit was 65 percent.

If, however, a command finds it already has more E-4s than authorized, eligible E-3s with 18 months time in grade may still be promoted, according to the new policy. Waiver rules remain unchanged, while promotions to E-4 that are guaranteed by enlistment contracts or through the Stripes-for-Skills Program are exempt from the policy ceiling.

POWER LINE TRAINING

Engineer Branch, MILPERCEN, is looking for qualified volunteers to attend the Electric Power Line course offered by the Air Force at Sheppard Air Force Base, TX. Volunteers should have primary MOS of 51R, be in the pay grade of E5 or E6, have a physical profile of 111221, and possess pole-climbing ability. The course is eight weeks long and soldiers selected may attend in a TDY status and return to their parent unit or proceed thereafter to a new duty station. Applications should include the course number, J3ABR-54231-001, and be forwarded through the chain of command to MILPERCEN, ATTN: DAPC--EPT--F, 2461 Eisenhower Ave., Alexandria, VA 22331.

THE SRB

Retaining qualified and experienced soldiers in all MOS on active duty is the primary purpose of the Army's reenlistment program. Numerous options are made available to eligible enlisted through this program. For most MOS, enough soldiers take advantage of these reenlistment options to meet the personnel needs of the MOS. However, experience shows that, for some critical MOS, those options alone are not enough to insure the retention of sufficient numbers of qualified and experienced soldiers to meet the needs of the MOS. To increase the number of reenlistments in these critical MOS, the Selective Reenlistment Bonus (SRB) program was introduced.

Since 1 June 1974, when the SRB program became effective, more than 70,000 soldiers have received a Selective Reenlistment Bonus. Not every soldier is eligible for an SRB. Understanding who is eligible, how these bonuses are computed, and how a soldier whose MOS has no SRB can become eligible for such a bonus is essential for every soldier considering reenlistment.

Policies and procedures for awarding an SRB to an enlisted soldier are prescribed in Chapter 9 of AR 600-200, Enlisted Personnel Management System. The SRB is designed for flexibility. It is used to offer an attractive reenlistment incentive at any problem reenlistment point from 21 months to 10 years of active service. Under the SRB program, two reenlistment period "zones" have been established:

- Zone A—reenlistments between 21 months and six years of active service.
- Zone B—reenlistments between six and 10 years of active service.

Soldiers serving within their first 10 years of active service, who are qualified in designated critical MOS, and who reenlist or voluntarily extend their enlistments in the Regular Army for at least three years, may be paid bonuses not to exceed six times their monthly basic pay times the number of years of additional obligated service, or $12,000, whichever is less.

SQT UPDATE

Testing periods have been announced for 42 initial engineer SQTa and 14 revised SQTs. Many of the tests began as early as January 1979, while others will not begin until September 1981.

MOS		TEST ADMINISTRATION PERIOD	
		Active Army	Reserve Components
SQT 2, 3, 4	12B/C/	Jan 79-Jun 79	Jan 80-Jun 80
	(2nd version)	Jan 80-Jun 80	Jan 81-Jun 81
SQT 2, 3, 4	62B		Mar 80-Sep 80
	(2nd version)	Mar 80-Sep 80	Mar 81-Sep 80
SQT 2, 3, 4	51M	Jun 79-Feb 80	Jun 80-Feb 81
	(2nd version)	Jun 80-Feb 81	Jun 81-Feb 82
SQT 2, 3	51G, 81B, 82B	Sep 79-Apr 80	Sep 80-Apr 81
SQT 2, 3	51R, (51N)*	Sep 79-Apr 80	Sep 80-Apr 81
SQT 2, 3	51B, 51C	Dec 79-Jun 80	Dec 80-Jun 81
SQT 2, 3	52D, (52C)*	Mar 80-Sep 80	Mar 81-Sep 81
SQT 2, 3	62E/F/J	Jun 80-Jan 81	Jun 81-Jan 82
SQT 2, 3	62G/H	Sep 80-Apr 81	Sep 81-Apr 82

*SQTs for 51N and 52C have been completed, but test administration has been delayed indefinitely pending resolution of some MOS structural problems.

ELIGIBILITY

To be eligible for a SRB, a soldier must meet all of the following criteria:

- He must be serving on active duty, other than active duty for training, in pay grade E-3 or above.
- He must be qualified in a primary MOS designated for an SRB. The MOS must have been designated as the soldier's PMOS at least three months prior to discharge/release from active duty or beginning of service on an SRB-qualifying extension.
- He must have at least 21 months, but not more than 10 years, of total active service at the time of reenlistment or extension.
- He must extend his enlistment or reenlist within three months of discharge or release from active duty for at least three years.
- He must have attained eligibility for the bonus prior to the effective date announced for termination of the MOS from the SRB program.
- He must reenlist for continued active duty in the PMOS held at discharge, except for reenlistment for award of or duty in an MOS within the normal career progression pattern for the PMOS held at discharge. In this case, the SRB assigned to the PMOS will be used, regardless of whether an SRB has been assigned to the MOS for which the soldier is reenlisting.

To be eligible for a Zone A bonus, soldiers must also meet the following requirements:

- He must have completed at least 21 months of continuous active service, other than active duty for training, but not more than six years of active service immediately prior to discharge, release from active duty, or beginning service on an extension.
- He must reenlist or voluntarily extend his enlistment in the Regular Army for at least three years. The reenlistment or extension, when coupled with existing active Federal service, must provide a total period of active service of at least six years.
- He must not have previously enlisted or reenlisted, beyond six years of active service, or begun an extension which, when completed, will provide more than six years of total active service.

To be eligible for a Zone B bonus, the following additional requirements must be satisfied:

- He must have completed at least six years, but not more than 10 years, of active Federal service immediately prior to discharge, release from active duty, or beginning service on an extension.
- He must reenlist or voluntarily extend his enlistment in the Regular Army for at least three years. The reenlistment or extension, when combined with existing active service, must provide a total period of active service of at least 10 years.
- He must not have previously enlisted or reenlisted beyond 10 years of active service, or begun an extension which, when completed, will provide more than 10 years of service.

ARMY ENLISTED PROMOTION CRITERIA, FY 80

FOR PROMOTION TO	MINIMUM TIME IN SERVICE	MINIMUM TIME IN GRADE***	SELECTION METHOD	SELECTION LEVEL	FREQUENCY OF SELECTION	LEVEL OF QUALIFICATION
Grade E-2	6 Mos*	—	Commanding Officer	Unit	Daily	Fully Qualified
Grade E-3	12 Mos*	4 Mos.	Commanding Officer	Unit	Daily	Fully Qualified
Grade E-4	24 Mos*	6 Mos	Commanding Officer	Unit	Daily	Fully Qualified
Grade E-5	36 Mos*	8 Mos	Semi-Centralized	Local Selection Board	Monthly	Best Qualified in MOS
Grade E-6	7 Yrs.**	10 Mos	Semi-Centralized	Local Selection Board	Monthly	Best Qaulified in MOS
Grade E-7	None Considered in Determining Zone	Announced in Zone	DA Board	Dept. of Army	Annually	Best Qualified by Career Management Field
Grade E-8	None Considered in Determining Zone	Announced in Zone	DA Board	Dept. of Army	Annually	Best Qualified by Career Management Field
Grade E-9	None Considered in Determining Zone	Announced In Zone	DA Board	Dept. of Army	Annually	Best Qualified by Career Management Field

*May be waived within constraints.
**Soldiers who meet the minimum time in service requirement are placed in the primary zone and those requiring waiver are placed in the secondary zone. Each month available promotions are determined by DA and cutoff scores are then announced allowing that number of promotions to be made.
***may be waived by one-half.

ENGINEER PROBLEM

Military history includes numerous examples of tactical operations which can be used for training today's soldiers. Described below is one example of an unsuccessful deliberate attack.

In March 1943, Great Britain's 201st Guards Motor Brigade carried out a night attack on a ring of hills held by the enemy as an outpost of the Mareth Line in Tunisia, North Africa. The hills stretched 1,000 to 2,000 meters beyond the Wadi Zess, a dry river bed with steep banks ranging from 1.5 to 10 meters deep.

Air reconnaissance revealed digging and wire, but did not reveal two dense mine-fields nearly 1,000 meters deep between the Wadi and enemy positions. Two nights were available for patrolling, but in order to retain the surprise element, no patrolls were permitted beyond the Wadi. As a result, the minefields were undetected prior to attack.

Enemy positions were approximately 6,000 meters from those of the British and overlooked all of the intervening terrain. Working With nine and a half hours of darkness, the British allotted one and a half hours to cover the long approach, and two and a half hours to cross the Wadi and capture the objectives. The plan was to use the remaining five and a half hours of darkness to open vehicle crossings over the Wadi, and to put support weapons, ammunition, and radio vehicles onto the objectives before first light.

The brigade attacked with two motorized battalions forward, each consisting of three motor companies and an antitank company. The assault of the right battalion, the 6th Grenadier Guards, is described below.

The 6th attacked with all three motor companies forward, but no troops available to occupy Point 117, a spur leading off from the other battalion's objective. There was no reserve.

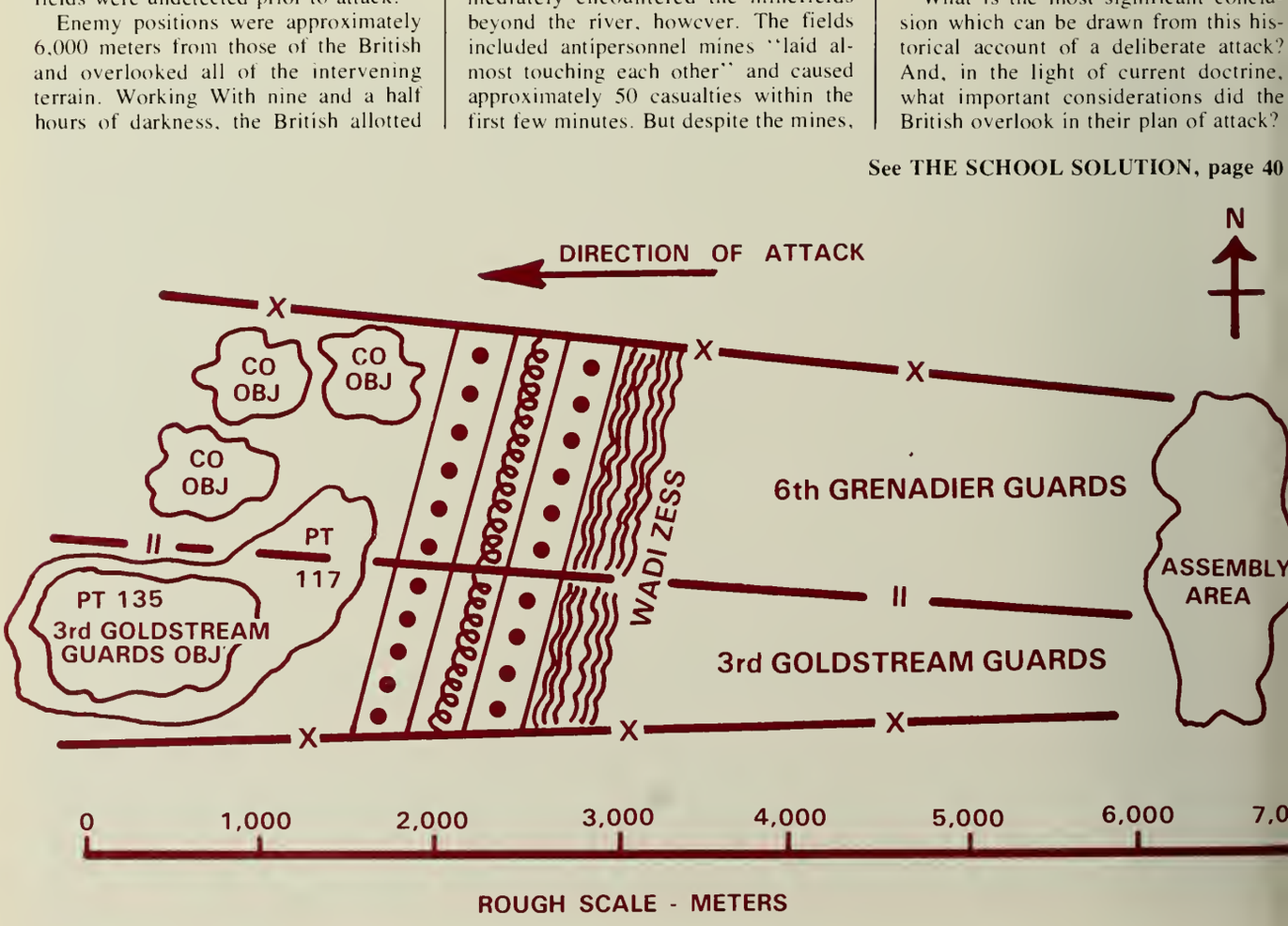
The 6th Grenadier crossed the Wadi on time and without incident. They immediately encountered the minefields beyond the river, however. The fields included antipersonnel mines "laid almost touching each other" and caused approximately 50 casualties within the first few minutes. But despite the mines, all three companies reached their objectives within the allotted time.

They were followed by an engineer force, whose task was to open a crossing over the Wadi for the antitank company and other support vehicles. By now, the enemy was firing heavily on the Wadi with mortars and machineguns from Point 117. Within an hour and a half, the engineers had crossed the river and breached the first strips of mines. British antitank guns and artillery forward observation vehicles (FOVs) started to cross. They immediately ran into more mines, which, coupled with direct enemy artillery hits, lit the area with blazing vehicles. All British FOVs were knocked out, as well as most of the antitank guns and personnel carriers. Dense belts of enemy mines prevented further attempts to move forward. All but two of the British sappers were killed or wounded.

Soon after first light, the three motor companies were ordered to withdraw under cover of smoke. The survivors of only two companies could be extricated. Casualties totaled 24 officers and 255 personnel of other ranks. Survivors were few.

What is the most significant conclusion which can be drawn from this historical account of a deliberate attack? And, in the light of current doctrine, what important considerations did the British overlook in their plan of attack?

See THE SCHOOL SOLUTION, page 40



NCO CHANNELS

As commander of the Noncommissioned Officer Education System (NCOES) Detachment, I have observed many soldiers reporting for the Advance Course who are deficient in basic academic skills (Math, reading, language). I find it necessary to solicit your assistance to insure that individuals nominated and selected to attend the Engineer Advance Course are given appropriate advice and guidance in preparing for this challenging step in their military careers.

Advance Course students must be screened well in advance of their reporting date to identify academic deficiencies and to take positive action to correct those deficiencies prior to their arrival at The Engineer School. I cannot provide a "cure all" to eliminate this problem, but the following suggestions may help you in defining the educational needs of soldiers selected from your battalions.

All students who report for the Advance Course must have a high school education, or its equivalent, but approximately one-third of all students fall below the 9th grade level in reading comprehension, math, language, and spelling. Some suggested actions to reduce these deficiencies are listed below:

- Unit education centers should conduct diagnostic testing for selected students to define skill deficiencies, and each center should develop its own program to satisfy student needs.
- Platoon sergeants and higher ranking NCOs must support their unit's education program and, if necessary, "use a big boot" to insure that personnel attend.
- The Basic Skills Education Program (BSEP) must have the support of all NCOs and junior enlisted personnel.
- All personnel should be informed of the off-duty educational opportunities, including the correspondence course system for professional development.
- Unit education goals should be set at the 12th grade level for E6s. Many of them were awarded GEDs years ago and have lost touch with basic academic skills.

Many students report to the Advance Course lacking knowledge of basic military subjects such as military justice, camouflage, map reading, and tactics. Key sections in the Soldiers Manual of Common Tasks which could help eliminate this deficiency are listed below:

- Individual Fitness, Skill Level 3
- Camouflage, Cover, and Concealment, Skill Level 1
- Land Navigation Skill Levels 3 & 4
- Leadership, Skill Levels 3 & 4
- Training, Skill Levels 3 & 4
- Tactics, Administration, Skill Level 4

For students who have recently been reclassified into an Engineer MOS, or who have been assigned to duties outside their primary MOS and have lost touch with engineer subjects, the following suggestions should help prepare for the Advance Course:

- Discuss engineer tasks and the combat engineer role in the combined arms team with experienced and knowledgeable NCOs and officers;
- Visit study activities where engineer subjects are available:
- Review Landmine Warfare, Reconnaissance, Field Fortifications, and Demolitions in Field Manuals, Training Manuals, and Soldiers Manuals. Recommend FM 5-34 as an excellent study guide in preparation for ENCOA.

Some students perceive that The Engineer School teaches advance course students how to fuse a mine, identify bridge parts, and other skills at Levels 1 & 2. In fact, some students actually ask, "What is a mine?" Basic material is taught in the Basic NCO Course and at unit level, not in the Advance Course. ENCOA has very little hands-on training. Students must already know basic bridge parts, types of mines, types of explosives, and they must be familiar with weapons and equipment that are common to combat and combat heavy units. It is disturbing that some engineer E6s with up to 15 years of active service cannot perform Skill Level 1 tasks.

Another problem involves weight standards. Approximately 20 percent of all ENCOA students are overweight when they report to The Engineer School. Some are grossly overweight. I hope you will caution your troops well in advance of their reporting date since a weight problem can become a matter of record on their Academic Efficiency Report. Students are required to achieve a passing score on the Staff and Specialist PT Test during the course.

I have addressed only the deficiencies of ENCOA students in this letter, but that does not mean that all students have problems. In fact, the majority of NCOs who arrive here are high quality and a tribute to their respective units. If you need additional -information or if I can offer further assistance in preparing your soldiers for ENCOA, please don't hesitate to contact me. Telephone commercial 703-664-1073, or AUTOVON 354-1073.

DELNORA RECTOR
1SG, USA
Commanding
NCOES Detachment
3rd Battalion, USAETBDE
Fort Belvoir, VA 22060

ENGINEER HOTLINE

If you have a problem relating to engineer doctrine, TOE organization, MOS, equipment, manuals, training, or training development, call the Engineer HOTLINE, Autovon 354-3646 or commercial 703-664-3646. Identify yourself by name, unit/activity, unit address, and phone number. Then simply identify the subject matter and problem. All information is recorded on tape and reviewed three times daily. Experts on the subject of your problem will be contacted immediately and tasked to respond by telephone, if possible, within three days or as soon as possible. Since HOTLINE was initiated by The Engineer School last July, an average of 16 calls per month have been received. If you have a problem, don't hesitate to call the Engineer HOTLINE.

RESERVE COMPONENTS

OFFICER ADVANCE COURSE

Two U.S. Army Reserve schools are scheduled to teach two phases each of the USAR Engineer Officers Advance Course this summer at Fort Belvoir, VA. Phases IA and IV will be taught 15–28 June by the 3288 USAR School of Greenville, S.C., while phases II and VI will be taught 6–19 July by the 1036 USAR School of Farrell, PA. Prerequisites for attendance at either session include the following:

- Membership in the US Army Reserve or National Guard
- A grade of first lieutenant or above
- Previous completion of any Officer Basic Course

Applications will not be accepted for phases previously completed or from personnel who have previously completed all requirements of the Engineer Officers Advance Course. In addition, applicants for phase IV must have, as a minimum, an Interim Secret Security Clearance, and applicants for phase IA must have a Confidential Security Clearance.

Applications for Active Duty for Training should be processed through normal command channels. Additional information or questions regarding enrollment should be addressed to: Commandant, US Army Engineer Center, ATTN: ATZA-DTR (Ind Tng Sec)), Fort Belvoir, VA 22060. Telephone Inwats 800-336-3095 (ext. 4095), commercial 703-664-4095, or AUTOVON 354-4095.

PROFESSIONAL ASSOCIATIONS

Most professional associations exist for the primary purpose of disseminating information about developments and issues of interest to their members. Among the professional associations available to members of the Army Reserve are the following:

- *Association of the United States Army*. Membership is open to all members of the US Army Reserve and includes a subscription to "ARMY" magazine. Address: 2425 Wilson Boulevard, Arlington, VA 22201.
- *Reserve Officers Association of the United States*. Membership is open to all officers of the USAR and includes a subscription to "OFFICER" magazine. Address: 1 Constitution Avenue, N.E.; Washington, D.C. 20002.
- *Enlisted Reserve Association*. Membership is open to all enlisted members of the USAR. Address: 1 Constitution Avenue, N.E.; Washington, D.C. 20002.
- *Senior Army Reserve Commanders Association*. Membership is open to all senior commanders, deputy commanders, and chiefs of staff of USAR units. Address: % LTC Francis H. Bland, Secretary/Treasurer, 3101 Bardstown Road, Louisville, KY 40205.

CIOR COMPETITION

The Interallied Confederation of Reserve Officers (CIOR) is looking for officers and enlisted athletes to compete in the CIOR military skills competition in Montreal during the period 30 July–8 August. The competition will include running and swimming, rifle, pistol and submachine gun marksmanship, and orienteering. The U.S. will send a 24-man team of officers and enlisted personnel to compete against Reserve teams from 12 of the 15 NATO nations. CIOR applicants should be able to run five miles in less than 32½ minutes, swim 50 meters in 36 seconds, and do 10 pull-ups. Interested individuals should contact Captain Roger Harvey, USMPTC, Building 189, Fort Sam Houston, TX, 78234 for further information and application procedures. Application deadline is 20 March.

REPORTING CHANGES IN STATUS

Members of the US Army Reserve who have a change in address, marital status, number of dependents, or civilian employment are required to report those changes. Changes in physical condition that would prevent meeting prescribed physical or mental standards must also be reported. Non-unit Ready Reservists should report changes in writing to the Commander, US Army Reserve Components Personnel and Administration Center, ATTN: AGUZ-RMR-D, 9700 Page Boulevard, St. Louis, MO 63132. Changes in physical status should be addressed to office symbol AGUZ-RCH. Members of Troop Program Units should report changes to their unit commanders during scheduled meetings.

TRAINING REG CHANGES

FORSCOM Regulation 350–2, the Reserve Component's "bible" for training, will undergo major surgery between now and the end of the current fiscal year. The new document's proposed effective date is October 1.

To be cut from the current regulation will be as many appendices as possible. The basic document will also be pared down to allow Reserve Component commanders more flexibility.

USAR STRENGTH

U.S. Army Reserve strength has increased for the first time since the beginning of the All Volunteer Army era. Paid drill strength (PDS) increased from 185,753 to 189,990 in Fiscal Year 1979. The trend is expected to continue as a result of bonuses, full-time manning, split training, and full-time recruiters.

NG FULL-TIME PROGRAM

The Army National Guard's Full-Time Military Program was developed to enhance the readiness posture of selected ARNG units. It complements the technician program and seeks to remedy the current shortage of full-time personnel needed for a strong, effective National Guard.

The program has two distinct aspects: Conversion to Full-Time Military (CFTM) and Additive Full-Time Manning (AFTM).

CFTM concerns vacant technician positions designated to be filled by full-time military personnel. Any vacant position not designated to be filled by merit promotion can be filled by a Guard member in a full-time military status, provided the member meets the requirements for such duty. A CFTM person occupies a TOE position within the assigned unit and is eligible to compete for unit positions and promotions.

The local unit has the option to fill all authorized full-time positions. Priority will usually be given to unit members, other Guard members, and active Army, in that order. Initial projections suggest that active Army personnel will fill ap-

Platoon Sergeant Richard McBain drives home a connector on a Bailey Bridge which his Massachusetts National Guard Unit—Company B, 101st Engineer Battalion, 26th (Yankee) Infantry Division–constructed recently as a temporary replacement for the condemned Pearl Street Bridge in Lowell, MA. More than 75 citizen-soldiers of Company B and Headquarters Company turned out for the weekend training and community assistance project. (Photo by SP5 Thomas J. Spisak)

proximately one percent of the available positions.

Only CFTM personnel will occupy unit positions. The unit commander exercises command supervision over all full-time members of his unit, and the commander or a designee rates and/or evaluates full-time personnel the same as other members of his unit.

Additive Full-Time Manning allows additional full-time personnel to be attached to selected units in order to improve their readiness.

AFTM personnel are assigned duties compatible with their MOS. They work for the unit commander but do not occupy a TOE position. They must attend unit drills and annual training in addition to carrying out their daily work assignments. AFTM personnel are assigned at state level and serve under Title 32 U.S.C., which places authority for control of the vast majority of full-time military personnel under the state adjutants general.

Persons entering active duty under the Army National Guard's Full-Time Military Program will be entitled to most of the benefits and privileges of Active Army personnel.

The program is expected to be ongoing, and to offer career opportunities for advancement and retirement.

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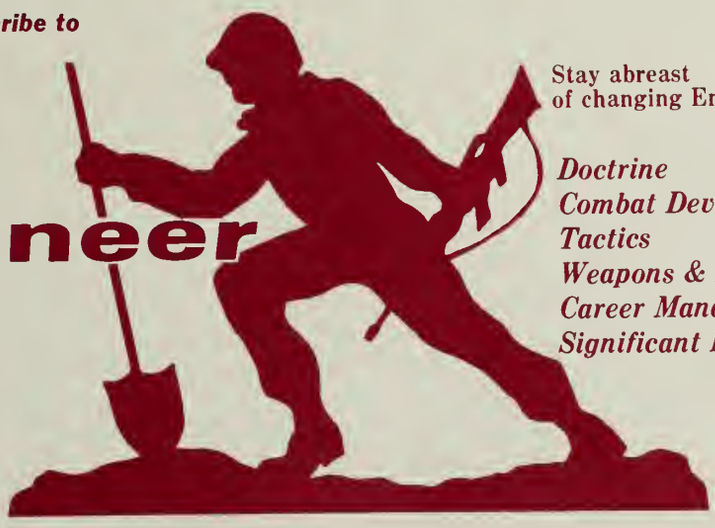

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THE SCHOOL SOLUTION

The most significant conclusion to be drawn from the night attack of Great Britain's 201st Guards Motor Brigade in March 1943 is that an antipersonnel minefield should not be able to stop a well-planned, determined attack by first class infantry.

Several breaches of current doctrine are obvious. The first principle of offensive operations is to "see the battlefield." The implication is that engineers help the tactical commander "see the battlefield" by conducting reconnaissance to provide information on obstacles. In this case, reconnaissance was not conducted for security reasons. Thus, the British brigade had no knowledge of the minefield before the attack. If possible, troops who conduct the breach should be those who conduct the reconnaissance.

The failure to breach the minefield was due to the lack of adequate breaching resources. Regardless of reconnaissance operations, engineer resources must be placed when and where a requirement is likely. One must plan for the worst, i.e. all contingencies.

Before an obstacle breach can be attempted, enemy weapons must be suppressed. Because enemy weapons on Point 117 (10 machineguns) were not suppressed, the breach was attempted under very heavy direct fire.

Although darkness was used to screen enemy observation, the breach was not completed by first light. The effectiveness of enemy weapons, greatly increased, of course, as soon as the enemy was able to observe the breaching operation. Smoke should have been used to obscure the enemy's observation in daylight. With smoke, the breach attempt may have succeeded.

The far side of the obstacle was not completely secured, as it should have been under current doctrine. That does not mean that a deliberate breach can be conducted *only* after the far side of an obstacle is secured. But, after the British infantry had gallantly and successfully crossed the minefield, not enough troops remained to secure Point 117.

Infantry must not be separated from heavy support weapons for long periods. Remember that Soviet defense doctrine requires a heavy armored force in reserve. The lack of heavy support weapons in this case prevented the infantry from withstanding the enemy counterattack.

SUMMARY

To summarize, the courageous British attack failed primarily due to a lack of reconnaissance prior to and during the attack. Other mistakes contributing to defeat were: the failure to suppress enemy weapons; the failure to use smoke to obscure enemy observation; the failure to secure the far side of the obstacle; and the failure to reduce the obstacle.

*U.S. GOVERNMENT PRINTING OFFICE 1980—0—620—274-1

ANNUAL ENGINEER DINNER

The 113th Annual Engineer Dinner will be held Friday, May 9, at Mackenzie Hall, Fort Belvoir, VA. Tickets are $12 per person and can be ordered in advance by sending a check or money order, payable to *113th Engineer Dinner*, to the Protocol Office, U.S. Army Engineer Center, Fort Belvoir, VA 22060. Ticket requests received by May 1 will be mailed. Requests received later than May 1 must be picked up at the Fort Belovir Protocol Office or at the door of Mackenzie Hall on the evening of the event. The Chief of Engineers, Lieutenant General John W. Morris, will deliver the main address. Presentations of the annual Itschner and Sturgis Awards will also be made that evening. The Counterpart Dinner for spouses will be held the same evening at the Main Enlisted Club. The Engineer Ball will be held Saturday, May 10, in the Mount Vernon Room of Mackenzie Hall. For additional information, call AUTOVON 354-4300.

The primary purpose of our arms is peace, not war—to make certain that they will never have to be used—to deter all wars, general or limited, nuclear or conventional, large or small—to convince all potential aggressors that any attack would be futile—to provide backing for diplomatic settlement of disputes—to insure the adequacy of our bargaining power for an end to the arms race.

John F. Kennedy

205
ENGIN

Engineer

THE MAGAZINE FOR ARMY ENGINEERS

SUMMER 1980

The 7th Engineer Brigade

Beyond the Call

Corps Engineers Far Forward

DEPOSITORY
JUN 26 1980
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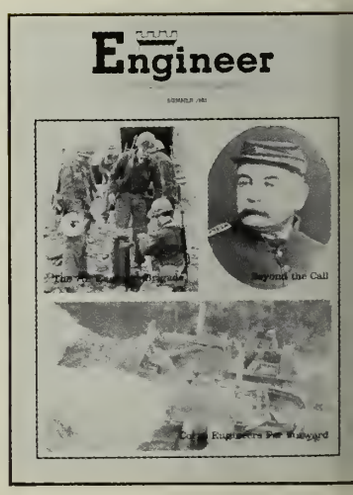
THE COVER

Feature articles illustrated on the cover include *Corps Engineers Far Forward* (lower photo) starting on page 8, *Beyond the Call* (upper right) starting on page 24, and *The 7th Engineer Brigade* (upper left) starting on page 26.



Engineer

THE MAGAZINE FOR ARMY ENGINEERS

VOLUME 10 SUMMER 1980 NUMBER 2

FEATURES

8 **CORPS ENGINEERS FAR FORWARD**

by LTC Fred C. Edwards and MAJ Stephen E. Draper

13 **THE ITSCHNER AND STURGIS AWARDS**

by the ENGINEER Staff

16 **THE REALITIES OF RIVER CROSSINGS**

by MAJ Douglas J. George, RAE

20 **PLAY IT AGAIN**

by CPT Denis Gulakowski

24 **BEYOND THE CALL**

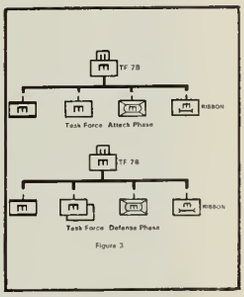
by the ENGINEER Staff

26 **THE 7TH ENGINEER BRIGADE**

by MAJ Al Bornmann and SGM Larry David

30 **SPECIAL REPORT: THE ENLISTED PERSONNEL MANAGEMENT SYSTEM**

by the EPMS Task Force, MILPERCEN



Page 11

Page 24

Page 29

DEPARTMENTS

2 **NEWS & NOTES**

6 **FORUM**

34 **OFFICER CAREER INFO**

37 **ENLISTED CAREER INFO**

38 **RESERVE COMPONENTS**

39 **ENGINEER PROBLEM**

40 **THE SCHOOL SOLUTION**

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JUN 26 1980

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

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News & Notes

SUCCESSFUL ARTEP

Construction of the two-lane Bailey Bridge above was one of many tasks accomplished by engineers of Fort Bragg's 27th Engineer Battalion (CBT) (ABN) and Fort Campbell's 20th Engineer Battalion (CBT) during a recent seven-day ARTEP at Fort Bragg, N.C. Most tasks were construction in nature, including the upgrading of the Fort Bragg firebreak system, construction of timber trestle bridges and culverts, and airstrip runway-improvements. Other ARTEP tasks included demolitions, route reconnaissance, bridge classification, and target folders. The 548th Engineer Battalion (CBT) of Fort Bragg provided professional support throughout the ARTEP.

ARMY ENGINEERS SUPPORT OLYMPICS

The 535th Engineer Detachment, headquartered at Fort Monmouth, N.J., played an active role in supporting the XIII Winter Olympic Games at Lake Placid, N.Y. The 535th, a field unit of the Facilities Engineering Support Agency (FESA), provided emergency electrical power for the Olympic Games on February 19 when commerical power went out on Mount Von Hovenberg and throughout the Lake Placid communications center. Enlisted engineers of the 535th activated three gas turbine mobile generators and kept them in use for 14 consecutive hours following the commercial power failure. Ten additional generators were manned by 535th personnel and could have been used, if necessary. The 17 Army engineers who participated in the back-up power operations included "teams" from West Point, Fort Belvoir, Fort Eustis, Fort Monmouth, and Fort Knox. Providing emergency power is a key element of FESA's mission. The agency is one of the Army's first lines of defense against prolonged power failure in critical areas worldwide.

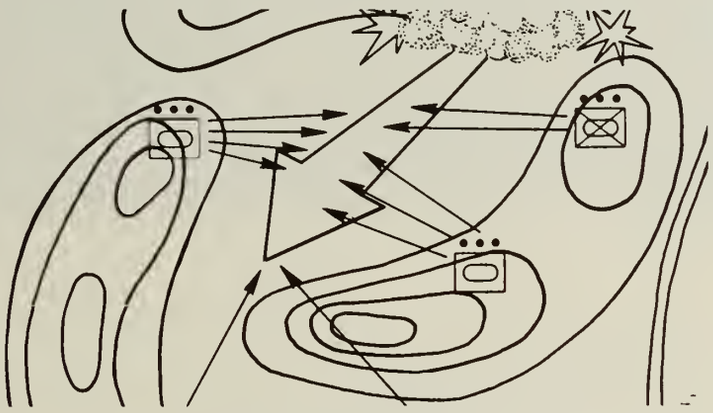
continued

HERO HONORED

Sergeant First Class (P) Martin Miller, a construction supervisor stationed at Fort Richardson, AK, recently received the Army's second highest peacetime service award for rescuing a drowning boy last year. Miller was presented the Soldier's Medal by Major General T.G. Jenes, Jr., commander of the 172nd Infantry Brigade in February. His heroic deed occurred in April 1979 during an ice-fishing trip at Six Mile Lake on Elmendorf Air Force Base when a friend's son fell through the ice. The boy's father dove in after him, but could find neither his son nor the only opening in the ice after being dragged by the heavy current. Miller jumped into the water and pushed both to safety. When he noticed the boy's breathing had stopped, Miller pounded the boy's chest and applied first aid. The boy finally resumed breathing and was rushed to the hospital, where he was treated for exposure and released. Miller, a 34-year-old native of Butte, MT, has been the NCOIC of the Directorate of Facilities Engineering at Fort Richardson for the past two years. He has worked as a crane operator, utilities foreman, and construction foreman during his 17-year Army career.

MOS 52E SHORTAGE

The Army is looking for soldiers interested in becoming prime power operators. A one-year training course at Fort Belvoir, VA, leads to MOS 52E, Prime Power Production Specialist, with an additional skill identifier in either mechanical electrical, instrumentation, or health physics. Prime Power Specialists operate and maintain Army non-tactical diesel and gas turbine generators. They may also be called on to work with heating, ventilation, air conditioning, boiler operation, and power distribution. The next class is scheduled to start in January 1981. If you're interested, write to the US Army Facilities Engineering Support Agency ATTN: Training Division, Fort Belvoir, VA 22060. Or call Commercial 703-664-5235 or AUTOVON 345-5241.



BATTLE REPORTS

Terrain reinforcement increases the advantages of the defender. It may consist of extensively engineered obstacles or simply an infantryman's fighting position. Terrain reinforcement counters an enemy's advantage of weaponry, superior numbers, or mobility. The latest in the TRADOC "Battle Report" series describes one type of terrain reinforcement—the tank ditch—and its use on the battle field. *Battle Reports* are used to disseminate lessons learned about how to fight on the modern battlefield. They provide interim guidance until their content can be integrated into appropriate how-to-fight, how-to-support, or other doctrinal publications. Army Training and Evaluation Programs (ARTEP), Field Manuals (FM), and Training Circulars (TC) continue to be the primary training references. TRADOC Bulletins, such as the *Battle Report* series, supplement them with an explanation of why we are training in a given manner. TRADOC Bulletins are cataloged in DA Pamphlet 310-3. The series is numbered consecutively, and each bulletin is distributed by the US Army AG Publications Center to all pinpoint account holders who indicate a desire to receive them. The *Battle Report* on Terrain Reinforcement/Tank Ditching is Number 13 in the series and is dated 28 March 1980.

News & Notes continued

MEMORIAL TO FORMER CHIEF

Mrs. Jane Watson Gribble unveils a memorial to her deceased husband, Lt. Gen. William C. Gribble, Jr., during recent ceremonies at Fort Belvoir, VA. The memorial is a new entrance gate to the Kingman Building complex, which houses several Corps of Engineers activities. Gribble, who died last June, retired in 1976 after serving as the Army's 43rd Chief of Engineers. His 35-year career was notable for assignments of expanded responsibility in the scientific and engineering fields. He was greatly respected as a leader and manager, and is credited with developing the technical specifications for the Army's first nuclear power plant.

FAMECE TERMINATED

The development program for the Family of Military Engineer Construction Equipment (FAMECE) was terminated last October by Department of the Army. FAMECE was an earthmoving equipment system designed to use a standard power section to doze, scrape, load, carry, place and compact earth in support of combat operations. The system included eight vehicles. Three reasons were cited in the decision to terminate FAMECE: (1) an official change in system distribution, limiting its use to airborne/airmobile organizations only; (2) lack of user acceptance as a result of troop operational testing; (3) problems with safety, human factors, reliability, and maintainability. These constraints limited the number of vehicles to be procured such that they could not be justified as cost-effective. An evaluation of possible alternatives to FAMECE resulted in the decision that Military Adaptation of Commercial Items (MACI) is the best approach to meet requirements for the near future (FY 81–86), given the constraints of program funding and time for acquisition.

STRONGER BRIDGING

The Army is studying the possibility of using composite materials instead of pure aluminum in future bridging equipment. The material, graphite fiber and epoxy resin, isn't new, but its application to military bridge structures is. The study is being conducted by the Mobility Equipment Research and Development Command. If results of the study are favorable, bridging components of future systems could be significantly lighter and stronger than prototype bridges of the "Bridging for the 1980s" system currently being evaluated.

60TH ANNIVERSARY

The US Army Engineer Topographic Laboratories will celebrate its 60th anniversary in conjunction with its annual Engineer Day Open House on June 24. The event will feature demonstrations of the latest mapping and surveying technology. Indoor and outdoor exhibits will trace historic achievements of ETL and its predecessors, the first of which was a small Engineer Detachment of the Army Air Service founded on April 5, 1920.

TO&E CHANGES

Department of the Army Consolidated Change Table 300-68, 1 April 1980, implements some long sought changes in Engineer Tables of Organization and Equipment. The most notable changes involve TO&E 5-52H, Headquarters and Headquarters Company, Engineer Group; TO&E 5-58H, Combat Support Equipment Company; and TO&E 5-115H, Engineer Combat Batalion (Heavy). Change 8 to TO&E 5-52H returns the Mess and Maintenance Sections to the Group Headquarters Company. There is also a slight increase in vehicles and radios. Change 9 to TO&E 5-58H moves certain equipment from the Equipment Platoon to the Quarry Section to make it independent. It also adds a 5-ton wrecker to the DS Maintenance Platoon and adds radios for the platoon leaders. Changes to TO&E 5-115H will be published as Change 14 to TO&E 5-116, Change 12 to TO&E 5-117, and Change 12 to TO&E 5-118. The most important changes to these TO&Es include the following:

- the addition of squad and platoon radios
- the replacement of 20-ton dump trucks with 5-ton trucks in the line companies
- the addition of a 20-ton Dump Truck Section to TO&E 5-117
- the substitution of D-7 dozers for D-8 dozers in the line companies.

THE XM1 TANK

Staff Sergeant Steve Armstrong directs backing of XM1 "Abrams" Tank after demonstrating its vertical climbing ability at the Army's Lima, OH tank plant in late February, shortly after the first two production models had rolled off the assembly line. The XM1 is the first totally new US tank in more than 30 years. The hull and turret are welded from cut and shaped pieces of armor plate. The M60 series tanks, on the other hand, have cast hulls and turrets. The XM1 has a lower silhouette, better crew protection, greater speed, faster acceleration, and improved first round hit probability with its gyro-stabilized gun and fire control system. In addition to providing greater power, the 1500-horsepower turbine engine is much quieter, smokeless, and lighter in weight. The turbine engine starts easily in most weather conditions and is easier to maintain and repair than comparable diesel engines. The Army contracted for 110 of the new tanks in FY 79 and current plans call for more than 7,000 to be built over the next eight years.

FORUM

Strengthening the Backbone

MASTER SERGEANT ARCHER W. MILLER JR.

EDITOR'S NOTE: Forum is a new section or "department" designed to provide additional space for the expression of professional views by Army engineers worldwide. It is hoped that engineer officers, enlisted personnel, and DA civilians employed in Army engineer related jobs will take advantage of the opportunity to express their views on doctrine, organization, tactics, equipment, management, training, leadership, or any other subject with potential interest for soldiers in general, or engineers in particular. What you have to say is the most important consideration, not how you say it or how much you say. ENGINEER Magazine was originally intended to provide a forum for two-way communication, but feedback/input from the field has all but ceased during the last few years. Thus, we encourage your renewed participation in the communication process. If you have something worthwhile to share with others, we want to hear from you. The following article, reprinted from INFANTRY Magazine, is an excellent example of input from the field that we encourage.

The Noncommissioned Officer Corps, the backbone of our Army, is the life line between those who command and those who are commanded. Without the NCO, neither the commander nor the commanded can be effective.

Our NCO corps is strong, but can be strengthened. And while much has been written about how we should lead, fight, command, and train, not enough has been written about what our NCOs are supposed to do or how they can be improved.

The NCO's job, whether he is a corporal or a command sergeant major is:

To conduct the daily business of the Army.

To focus on the individual training of enlisted soldiers.

To insure that his soldiers have the individual equipment they are supposed to have and that it is in serviceable condition.

To insure that the enlisted soldiers function as effective team members.

To focus on the standards, care, profes sionalism, and military courtesy of the enlisted soldiers.

To advise, assist, and support those appointed over him.

I believe that there are four ways in which we can police and strengthen our time-honored ranks.

First, we must quit bellyaching about the Volunteer Army (VOLAR), about losing our authority (if, in fact, we are losing or have lost it), and about the Army's ills. We need to rechannel the energy we spend in those endeavors to make VOLAR work, to regain whatever authority we may have lost, and to work to correct the ills of our Army. After all, we are professionals and volunteers. If we do not like what we see but do not attempt to do anything to correct the problems then we should enter a new profession. When we hear others bellyaching, we must ask them what they are doing to correct the situation they speak

of, and we should offer advice on how to make the needed corrections. This will take moral courage on our part. After all, it is easier to gripe and to pass the buck than it is to take an unpopular position.

Next, we must rid our ranks of those nonproductive "stripe bearers" who make up a small but cancerous portion of our corps.

Our noncommissioned officers can be divided into three groups. Those in the first group immediately impress their superiors with their ability and desire to do the best job they can. When they say that a job is completed, we can rest assured that it is, and that it is usually done well. Unfortunately, as a regard for their effort, initiative, and ability, these NCOs are all too often given work because they earn the trust and confidence of their superiors.

The stripe bearers, on the other hand, impress their superiors, their peers, and their subordinates in just the opposite manner and, thus, are not called on to perform difficult, time-consuming tasks. Who wants to be embarrassed by a subordinate's poor performance? Who can trust him?

Unfortunately, however, they also receive good efficiency reports, letters, awards, promotions. In addition, they get soft jobs, work fewer hours, and are picked for choice TDY assignments and schooling because this is an easy way to get rid of them.

Those in the middle group, whom I call the average majority, observe these happenings, and they wonder—why should I excel if all it will get me is more work? The stripe bearers seem to get the same rewards. Is peace of mind and selfsatisfaction worth the effort?

SOLUTION

What is the solution? We must develop the moral courage to look the nonperformers in the eye and tell them they are not measuring up to the Army's standards. Some of them have never been told this before and honestly think their behavior is acceptable. We must tell them what the acceptable standards are, how they can reach those standards, and the action we will take if they do not, and give them a reasonable amount of time to demonstrate measurable improvement.

I admit that this is not an easy thing to do. It is much easier to look the other way, to let someone else take care of it, or to wait until a set of PCS orders makes it some other NCO's problem. When we do counsel, we must document our actions, or advice, and any and all changes in the soldier's performance so that we can present an honest appraisal and recommendation to our superiors, who have the authority to rid our Army of these destructive members of our corps should our efforts prove fruitless. No matter what decision our superiors make, we must support that decision.

The third thing we can do to strengthen our NCO corps is to groom not only our young corporals and sergeants, but the soldiers who aspire to those ranks as well. They are not really different from the way we were 10, 15, or 20 years ago when we were first-termers. We are still dealing with human beings, and the physical, safety, security, social, and self-fulfillment needs we had are the same ones our subordinates have today. We may live in a more permissive and educated society, and this may cause our soldiers to look at authority today in a different way. They understand that their superiors have a legitimate authority and with it, the power of coercion. Soldiers want their NCOs to communicate effectively with them, to have a certain expertise, and to gain their respect through the proper use of their power. Did we want anything different?

The fourth thing that we, the senior NCOs of today, must do is to instill in the senior NCOs of tomorrow an appreciation for and a sense of value in the time-tested traits and principles of leadership. We must do this by demonstrating those traits and principles to our subordinates. We must set challenging but attainable goals, insist on hard but fair and just discipline, demonstrate high standards of appearance, provide good training, and insure that we make productive use of their time.

Our subordinates see the Army through us—their immediate leaders. They do not realize or appreciate the size and complexity of our Army, or how it functions. The chain of command for our young soldiers for all practical purposes stops at the battalion level.

I feel it is time to clean out our ranks. This will, in turn strengthen our corps. We must quit passing the buck. We must accept our resonsibilities, analyze them, and demonstrate through our daily actions the proper traits and principles of leadership. We must treat our subordinates as we want to be treated—with respect, sincere concern, and honest interest. Above all else, we must exercise moral courage.

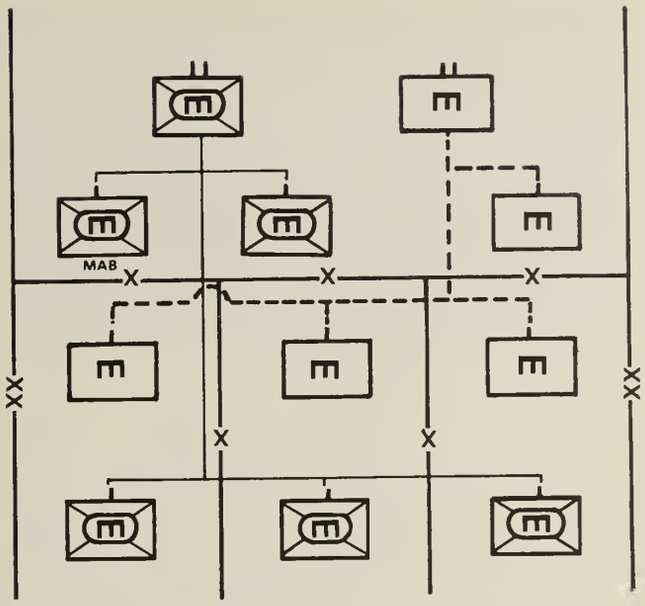
Master Sergeant Archer W. Miller, Jr., is a recent graduate of the Sergeants Major Academy. He is presently assigned as the First Sergeant, Headquarters and Headquarters Company, 2d Brigade, 101st Airborne Division (Air Assault).

Early planning is required for the preparation of antitank di

Corps Engineers Far Forward

The 78th Engineer Battalion and other Orange Forces engineers accomplished their mission during REFORGER 79, but it could have been done easier and much more efficiently

by LTC Fred C. Edwards & MAJ Stephen E. Draper



Typical deployment in USAREUR Divisional AO

	Combat Platoons	Combat Platoons	Equipment Platoons	Bridging (MAB)
Divisional	9	3	1	24
Corps	9	3	1	0
Total	18	6	2	24
	Bde AO	Division Rear		

FIGURE 1

Exercise CERTAIN SENTINEL/REFORGER '79 provided the 78th Engineer Battalion (Combat) the opportunity to function in direct support of an armored maneuver brigade. Different? Weird? Many adjectives have been used to describe this organization for combat, but "unorthodox" is probably the most applicable.

Several tactically sound reasons for placing a wheeled engineer battalion in this role are presented herein but the real reason is that all available engineers are needed as far forward as possible on the European battlefield. The engineer mission is so critical that "'story book" concepts of organization and employment must yield to the lessons learned over and over again on operations such as REFORGER, even if doing the job right requires unorthodox, adhoc organizations.

Due to the critical requirement for putting all available engineers as far forward as possible, corps engineer battalions in Germany are routinely placed in direct support of divisions. The organization is not new. What is new is that corps engineers are now being employed where the requirement is—up front in the maneuver brigade area of operations (AO). Typically, one line company will be placed in direct support (DS) of each maneuver brigade and employed by the brigade engineers alongside the divisional engineer company. Exercise after exercise has shown that a two-company task force is the minimum essential to handle the heavy engineer load. And, since the Brigade Commander fights the battle, the engineers must be responsive to him through the brigade engineer.

Exercise after exercise has demonstrated that a divisional engineer company cannot provide the Brigade Commander the needed responsiveness and also execute missions. This fact of life is recognized by engineers in Europe. Hence, majors are dispatched from both the divisional and corps battalions to form adhoc Brigade Engineer sections. The end result is the organization shown in Figure 1. The odd man out in the adhoc organization is the corps engineer battalion headquarters

and the one remaining combat company. During REFORGER '79, the Orange Force commander's concept of operations made good use of these assets.

The Orange attack plan is shown in Figure 2. The Main River was an obstacle in two respects. It slowed the initial momentum of the main attack, and it complicated lateral communications. The uncommitted line company from the 78th helped solve the first problem by being placed under operational control of the Crossing Area Control Group. The second problem was solved when the 78th Battalion Headquarters was placed in direct support of the western-most brigade. The maneuver brigade commander then had a battalion headquarters to control his engineer effort.

Placement of the battalion headquarters in the western sector also dovetailed with the Orange deception plan by helping to depict the main attack in the west. With the addition of a Ribbon Bridge company, Task Force 78 started the "war" with one divisional combat company, one organic corps combat company, and one Ribbon Bridge company, a force of over 500 engineers (see Figure 3). This is a lot of engineer horsepower for a maneuver brigade, but as the battle unfolded, even more could have been used. Up Front, engineer requirements are enormous.

The purpose here is not to present a "war story" about one operation, but instead to provide insight into difficulties facing corps and divisional engineers when operating far forward due to present-day organization and equipment. Granted, many of the problems would not have arisen if current doctrinal tenants of engineer employment had been followed. The counterpoint to this argument and, indeed, the reasons for this article, are that: in Europe, the engineer requirement is tremendous and is greatest in the forward area of operations; to fulfill the requirement, all divisional and corps engineers must work side by side; without changes in present organization and equipment, the capability of these engineers will be less than optimal.

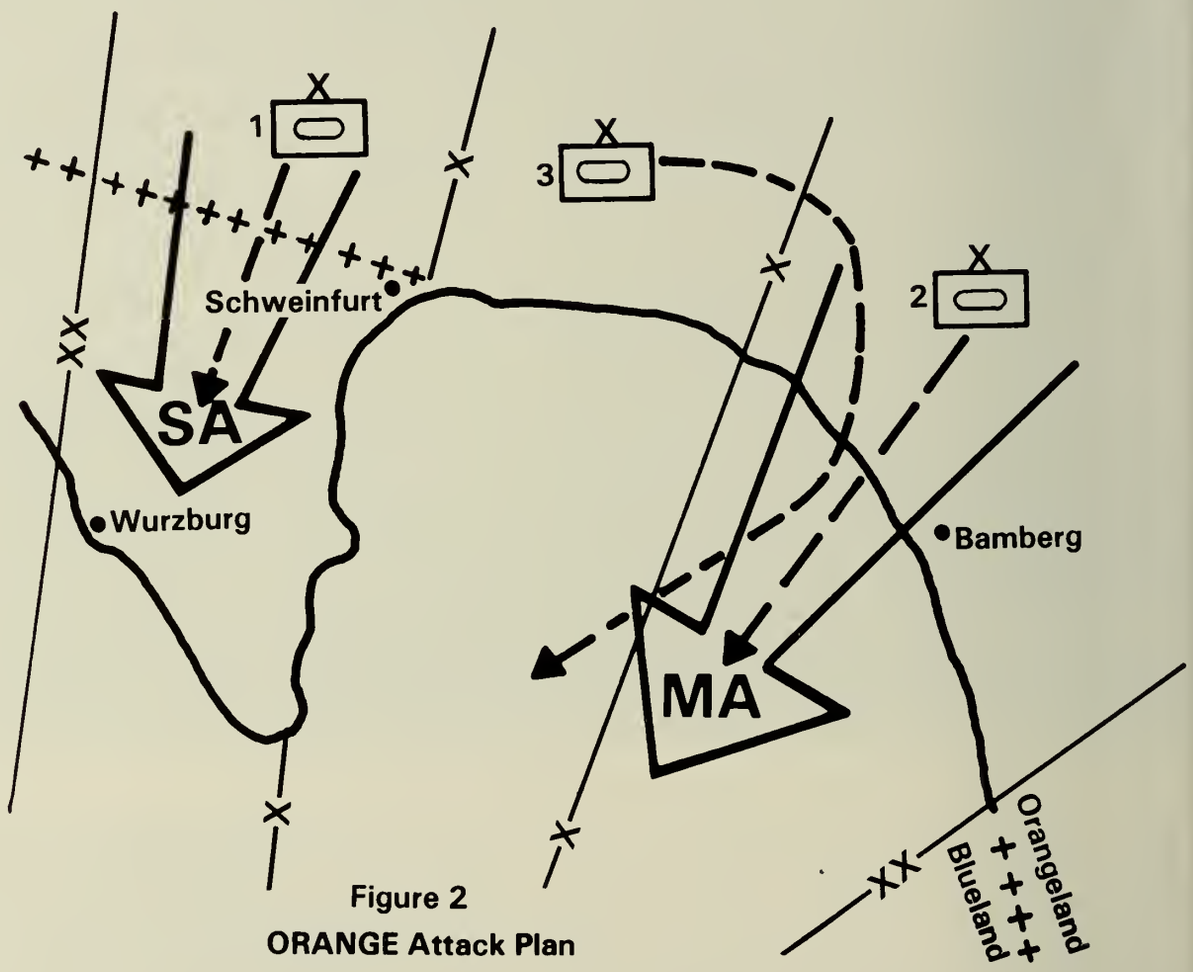


Figure 2
ORANGE Attack Plan

During REFORGER '79, Orange Forces participated in deliberate and hasty river crossings, and in offensive and defensive operations. Throughout the exercise the HQ of Task Force 78, commanded by a lieutenant colonel, provided the brigade commander superb engineer planning support, and engineer command and control. All battle plans had engineer input before execution. The effort and resources expended by the Task Force Headquarters to

keep pace with the maneuver force during the attack, however, were almost overwhelming. It required four engineer tactical operations centers to keep pace with the maneuver brigade. The Task Force tactical operations center was often 20–30 kilometers from the Headquarters support elements.

During the attack, the corps combat company could not keep pace with maneuver units. Hence, the divisional, tracked engineers provided direct support (DS) to the maneuver battalions, while the corps company handled the flanks and cleared bypassed obstacles. The attack moved fast due to target turn-over problems of the Blue Force. Blue Engineers had emplaced superb obstacles, but many were never executed. Had they been executed, the Orange brigade attack may have quickly bogged down because neither corps nor divisional engineers have adequate obstacle breaching capability. The ribbon bridge was superb and made hasty river crossings a "piece of cake" except for one lingering problem, bank preparations. It is completely assinine to delay a river crossing while a D-7 dozer is wheeled into position and off-loaded to begin bank preparations.

In preparing for the defense, the corps engineer company is the best asset due to haul capability, but it is foolish to believe that engineers can prepare a good hasty defense with the meager haul capability of the 5-ton dump truck. Up front, the keys to an effective defense are demolitions and mines, bulky and heavy stuff. Faced with a similar problem, the artillery rid itself of 5-ton dump trucks years ago.

Communications were a constant hassle, especially with 78th Battalion companies DS to other brigades. These companies needed FM capability for three nets: the brigade engineer net, their parent battalion's net, and their internal net. Presently, they can support only two nets. Similarly, the TF 78 commander required three nets: the divisional engineer net, the maneuver brigade net, and the internal net. Current capability provides only two. Due to the dispersal of forces, FM radio range was also a problem. The one retransmission unit authorized the battalion was not enough.

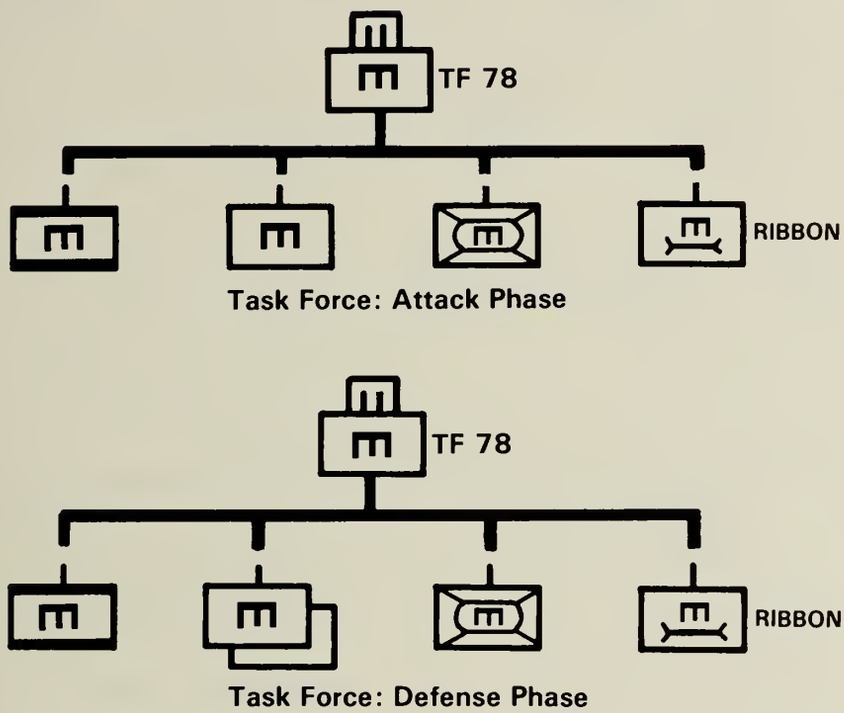
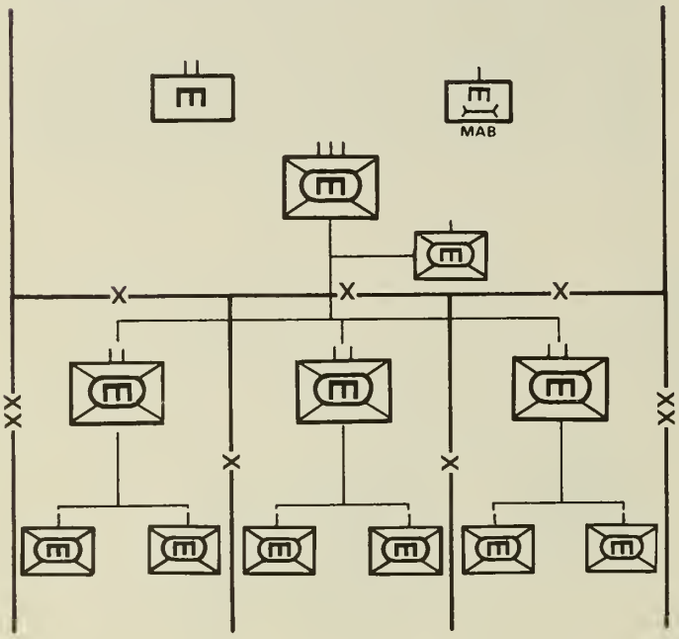


Figure 3

Survivability obviously decreases as units move forward. However, units without antitank capability, or even the passive protection of armored vehicles and winter camouflage are in for big trouble. TF 78 was constantly in enemy artillery range and was hit on several occasions by enemy air strikes.

Logistics worked with the ease of giving birth to a square elephant and would have been worse except for cooperation by the Division Support Command (DISCOM). The 78th Battalion Headquarters was in the westernmost part of the Orange sector. Three line companies were spread eastward across the division area of operations. Since the 78th is a corps battalion, use of

corps supply points was mandatory, as expressed in the operations (OP) order. Typically, corps supply and service installations are located behind the division. As the attack progressed, the supply lines for 78th Battalion units grew longer and longer. Consequently, additional communication problems were created by distance between the Battalion Headquarters and organic companies.



Proposed Engineer Deployment in Divisional AO

	Combat Platoons	Combat Platoons	Equipment Platoons	Bridging (MAB)
Divisional	18	3	1	0
Corps	0	9	1	24
Total	18	12	2	24
	Bde AO	Division Rear		

FIGURE 4

The situation became marginally manageable in the short run and totally unmanageable in the long term. At best, it drives the battalion staff batty. Simple procedures such as distribution of mail, issuing replacement equipment and movement of replaced personnel became astronomical problems.

The 78th Engineer Battalion and other Orange engineers accomplished their mission during REFORGER '79, but it could have been done easier and much more efficiently. The authors recommend that the following actions be taken:

- Recognize the requirement for a two-company force in the brigade Area of Operations and the brigade engineers; reorganize the division engineers accordingly. The organization shown in Figure 4 is recommended.
- Mechanize corps engineers who support mechanized units.
- Provide mechanized engineers with a mobile earth-moving capability (the UET will work).
- Provide a capability to rapidly clear mine fields.
- Provide more capability to haul munitions.
- Beef up FM communications. Provide a capability to operate on three nets at company level and provide one additional retransmission unit to corps battalions.
- Develop a logistics system which allows corps units to quickly transition from corps support facilities to DISCOM.
- Develop a firm doctrine concerning engineer target turn-over and teach the doctrine at all branch schools.

Lieutenant Colonel Fred C. Edwards is Commander of the 78th Engineer Battalion, 7th Engineer Brigade. Major Stephen E. Draper is the Executive Officer of the 78th Engineer Battalion.

SFC LOCKWOOD

The Sturgis Award

SFC Harold A. Lockwood is cited for exceptional achievement during 1979

The winner of the Sturgis Award for 1979 is Sergeant First Class Harold A. Lockwood, Company C, 78th Engineer Combat Battalion, 7th Engineer Brigade, VII Corps, USAREUR. SFC Lockwood's citation reads, in part, as follows:

"Sergeant First Class Harold A. Lockwood . . . is cited for exceptionally meritorious achievement and service from January 1979 through December 1979. During this period, SFC Lockwood served as Senior Drill Sergeant with the 3d BCT Brigade, Fort Leonard Wood, MO, and as acting Platoon Leader and Platoon Sergeant with C Company, 78th Engineer Battalion. As a drill sergeant, SFC Lockwood's skills were readily evidenced by his selection as Honor Graduate of the Fort Leonard Wood Drill Sergeant Academy. Maintaining this record of excellence, he was four times selected Drill Sergeant of the Cycle . . . at that training base. SFC Lockwood's attributes as a Platoon Sergeant with Company C are reflected in the accomplishments of his platoon during the latter half of 1979. During a five-month period of intensive activity, his platoon successsfully completed the following projects:

- Construction of two underground, reinforced concrete oil collection vaults;
- Renovation of a 70-foot permanently installed Bailey Bridge in the German community of Ettlingen;
- Construction projects for the Stuttgart Military Community, including a pressbox for the American high school football field, a communications security vault, a physical training facility . . . and two handball/racquetball courts.

That these projects were completed ahead of schedule while exceeding design specifications is . . . testimony to SFC Lockwood's managerial ability. That these projects were accomplished by a unit which had not been given a construction mission in two years is remarkable. Obviously, SFC Lockwood provided the essential leadership to mold his platoon into a highly efficient and effective organization.

SFC Lockwood exemplifies the ideal engineer NCO. He is a true professional whose accomplishments have . . . been outstanding."

PREVIOUS STURGIS AWARD WINNERS

1974	SFC Charles E. Oliver	79th Engineer Battalion
1975	SGT Douglas R. Carron	802d Engineer Battalion
1976	SSG James E. Skellion	27th Engineer Battalion
1977	SSG Humberto A. McLaren	802d Engineer Battalion
1978	SFC Lanny R. Hodges	94th Engineer Battalion

The Sturgis Medal is named for Lieutenant General Samuel D. Sturgis, Jr., former Chief of Engineers. The medal is offered *by the Society of American Military Engineers (SAME)* as an annual award to an active duty enlisted member of the U.S. Army to recognize outstanding contributions to military troop construction and/or base maintenance, by demonstrated technical and leadership ability. The award is presented to an individual within one of the following Army career fields: combat engineering, construction and utilities, power production, heavy equipment and maintenance, drafting, surveying, printing, special electrical devices, instrument repairman, and reproduction repairmen. The award was made for the first time in 1975 to Sergeant First Class Charles E. Oliver of the 79th Engineer Battalion for his outstanding performance of duties during calendar year 1974.

Other nominees for the Sturgis Award for 1979 included:

USAREUR: SSG Richard F. Flory, Company B, 79th Engineer Combat Battalion (Heavy), 18th Engineer Brigade.

FORSCOM: SSG Charles R. Parks, Company C, 39th Engineer Combat Battalion, Fort Devens, MA.

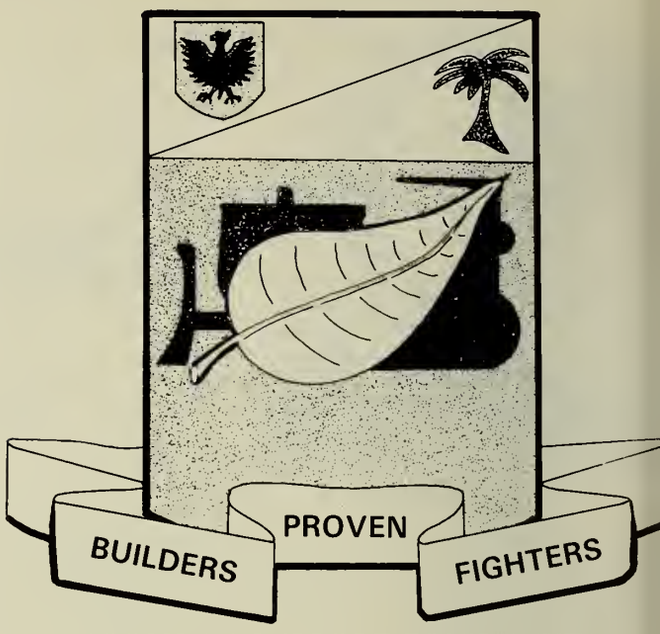
FORSCOM: SSG Alfonso Carrasco, Company C, 14th Engineer Combat Battalion (Corps), Fort Ord, CA.

TRADOC: SFC(P) Willie B. Jones, Company A, 2d Battalion, US Army Engineer Center Brigade, Fort Belvoir, VA.

WESTCOM: SGT Guy L. Hall, Headquarters Company, 65th Engineer Combat Battalion, Schofield Barracks, HI.

EUSA: SFC Richard J. Eckhardt, Company C, 44th Engineer Combat Battalion (Heavy), 2nd Engineer Group.

The Itschner Award



(COMBAT SUPPORT EQUIPMENT)

The 568th Engineer Company (Combat Support Equipment), 559th Engineer Battalion, 130th Engineer Brigade, V Corps, is the winner of the Itschner Award for Active Army units for calendar year 1979. The award citation, in part, reads as follows:

"The 568th Engineer Company . . . is cited for exceptionally meritorious achievements and service . . . During 1979, the company consistently demonstrated its outstanding construction and combat support capabilities and excelled in every area of operations, to include training, maintenance, and administration. Despite a serious shortage of equipment operators and NCOs, the 568th Engineer Company successfully completed such diverse tasks as the construction of scaled tank gunnery ranges, ... 15 kilometers of tank trail, . . . tank ditching exercises in support of the 3d Armored Division and other Central Army Group elements, and the construction of hull defilade firing positions for a variety of vehicles. While carrying out construction and combat support missions, the unit did not lose sight of its responsibilities to the men and women of the company. The esprit de corps and morale within the unit were unequalled. This is readily reflected in the 127 percent reenlistment rate during 1979 and the fact that a majority of those reenlisting did so for their present duty assignment. Education and self-improvement were emphasized and encouraged as an effective method to improve leadership, professionalism, and skill . . . The successful integration of women into the unit, along with their significant contributions to mission performance, was singularly noteworthy. By its actions, the 568th Engineer Company has made great strides in enhancing the role and image of Engineers in the modern battlefield . . . ."

The 568th was commanded by Captain Champney A. McNair, Jr., through February 27, 1979, and by Captain Sheldon L. Jahn from February 28 throughout the remainder of the year.

The 568th is physically located in Pioneer Kaserne, Hanau, Federal Republic of Germany.

The Itschner Awards are silver plaques named for the former Chief of Engineers, US Army, Lieutenant General Emerson C. Itschner. From 1960, when it was first awarded, until 1973, it was offered annually by the Society of American Military Engineers to one unit of the Army Corps of Engineers selected as the most outstanding unit during the previous calendar year. Since 1974, three awards have been offered annually to the most outstanding Active Army unit, Reserve unit, and National Guard unit of the Corps of Engineers.

Other nominees for the Itschner Award for Active Army units included:

USAREUR: Company B, 79th Engineer Combat Battalion (Heavy), 18th Engineer Brigade.

USAREUR: Company D, 16th Engineer Combat Battalion, 1st Armored Division.

FORSCOM: Company C, 548th Engineer Combat Battalion (Heavy), Fort Bragg, NC.

FORSCOM: 66th Engineer Company (ADM), 62d Engineer Combat Battalion (Heavy), Fort Hood, TX.

TRADOC: Company A, 2nd Battalion, 2nd Training Brigade (OSUT), Fort Leonard Wood, MO.

WESTCOM: Company A, 65th Engineer Combat Battalion, 25th Infantry Division, Schofield Barracks, HI.

EUSA: Company D, 44th Engineer Combat Battalion (Heavy).

PREVIOUS ITSCHNER AWARD WINNERS (Active Army)

YEAR	UNIT	COMMANDER(S)
1960	100th Engineer Company (Float Bridge), Fort Belvoir, Virginia	CPT Albert L. Schneider
1961	562d Engineer Company (CBT) Alaska	CPT Kermit Hoeft
1962	Company B, 307th Engineer Battalion (ABN), Fort Bragg, NC	CPT Harry A. Hodges
1963	Company A. 8th Engineer Battalion (CBT), Korea	CPT J.H. Carnes, Jr.
1964	618th Engineer Company (Light Equip) 307th Engineer Battalion (ABN) Fort Bragg, NC	1LT Daniel R. Schroeder
1965	Company A. 326th Engineer Battalion 101st Airborne Division, Vietnam	CPT George T. Kimbro
1966	Company A, 39th Engineer Battalion (CBT) 45th Engineer Group (Constr), Vietnam	CPT George P. Johnson
1967	173d Airborne Engineer Company, Vietnam	CPT Glenn H. Lehrer & CPT Thomas E. Weber
1968	Company C, 39th Engineer Battalion (CBT), 45th Engineer Group (Constr), Vietnam	CPT Philip H. Izard
1969	87th Engineer Company, 199th Infantry Brigade, Vietnam	CPT Robert J. Walters & CPT Mark F. Moran
1970	Company C. 8th Engineer Battalion (Airmobile), Vietnam	CPT Donald J. Hejna
1971	Company A, 326th Engineer Battalion 101st Airborne Division (Airmobile), Vietnam	CPT Charles B. Yonn III & CPT John T. Sevier
1972	518th Company (CBT), 193d Infantry Brigade, Fort Kobbe, Canal Zone	CPT Philip C. Gee & CPT Garry V. Cooper
1973	370th Engineer Company (Constr Sup), 24th Engineer Group, USAREUR	CPT Robert Potter & CPT John W. Braden, Jr.
1974	Company D, 802d Engineer Battalion, 2d Engineer Group, Eighth U.S. Army	CPT David E. Spaulding
1975	Company B, 10th Engineer Battalion (CBT) 3d Infantry Division	CPT Albert Kraus
1976	Company A, 293d Engineer Battalion (CBT) (HVY) 24th Engineer Group, USAREUR	CPT Leon J. Lang
1977	Company C, 547th Combat Engineer Battalion, 130th Engineer Brigade, V Corps, USAREUR	CPT Richard A. Nance
1978	Company A, 12th Engineer Battalion, 8th Infantry Division, USAREUR	CPT Wayne F. Leadbetter, Jr.

ARNG AWARD

The 1979 Itschner Award for the Army National Guard goes to the 269th Engineer Company (Construction Support), Florida Army National Guard, Live Oak, FL. The award citation, in part, reads as follows:

"The 269th Engineer Company maintained an average actual strength of 103 percent during 1979. With a nonexistent draft, this remarkable. . .accomplishment was due in part to a total collective effort by unit members to sell the National Guard, and to a dedicated, concerted effort in support of the unit recruiting program. The spirit of the unit training program is exemplified by its selection as a superior unit for Training Year 79. The conduct of realistic meaningful training is . . . an important factor in the unit's outstanding success in recruiting, retention, morale, and esprit-de-corps. Unit performance is a direct result of strong leadership, an effective chain of command, and an active recruiting program."

USAR AWARD

The US Army Reserve unit selected to receive the Itschner Award for calendar year 1979 is Company D, 467th Engineer Battalion, Greenville, MS. The award citation, in part, reads as follows:

"During 1979, Company D, 467th Engineer Battalion, received the First US Army Excellence in Training Award, achieved a satisfactory Annual General Inspection rating, and was selected as the most outstanding company-size unit in Army Readiness Region IV. Company D . . . has been highly successful in the areas of maintenance, unit strength, attendance, training, and readiness. Dynamic training has been a leading factor in sustaining outstanding unit esprit-de-corps and morale. An active community support program has made Company D well known and accepted by the local civilian community."

Rivers have never been a handicap to the side with the upper hand in war. Really, it is rather amazing that after all these centuries of disproof, we still talk and think of them as obstacles. Basically, when prehistoric man invented the boat, rivers ceased to be obstacles. One can argue that, intrinsically, they became just the opposite. From the time that Alexander made his classic crossing of the Hydaspes River in India in 326 BC until the mighty Rhine was conquered in 1945, the great majority of assault river crossings have been successful.

Sure, there have been failures, and these have been adequately documented. The failure at the Rapido in 1944 provides an excellent example of how not to do it! Why, therefore, have river crossing attacks been almost infallibly successful?

First, as a commander, you never attack unless you fancy your chances. That is, unless the odds are in your favor. When you have to put your troops into the attack across a river, you are even less inclined to gamble.

Second, often a river crossing attack can be foretold and foreseen weeks in advance so that planning, preparation, and even rehearsal can be done almost at leisure.

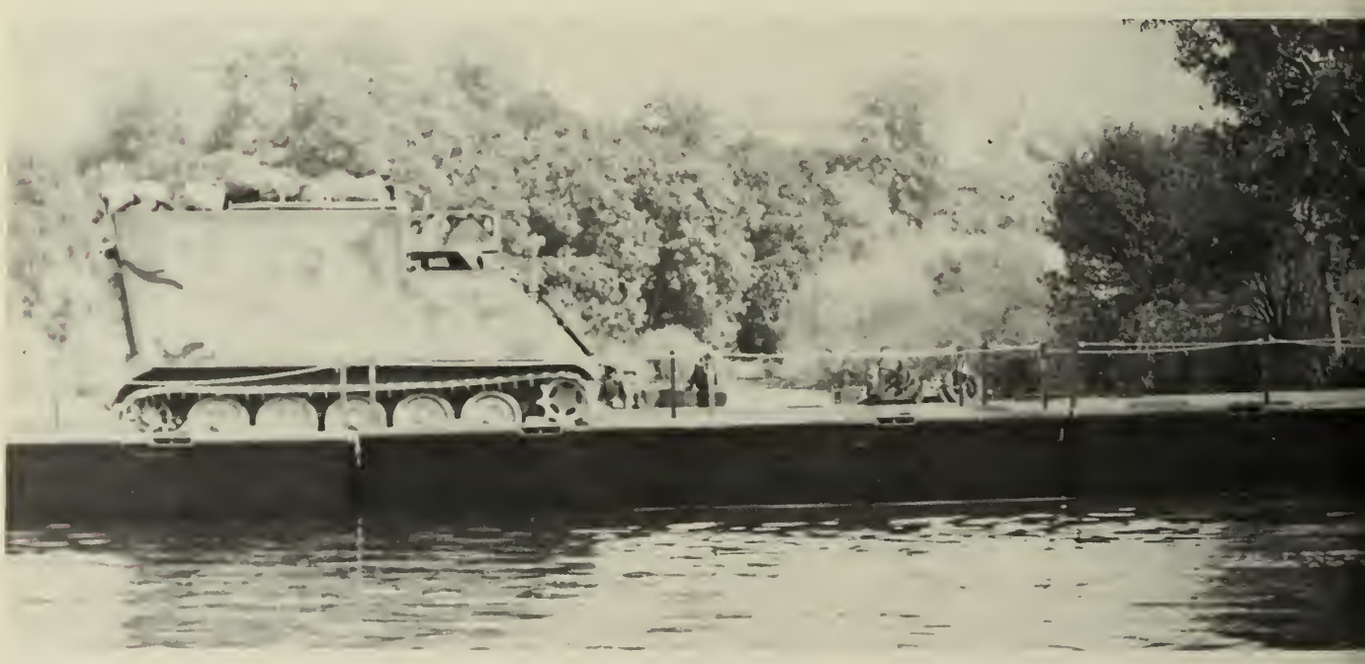
Third, when an advancing force reaches a river, it can pause to mount its attack (if a hasty crossing is not feasible) because the enemy is unlikely to thrust across a river from a defensive posture. The attacker also has the advantage of knowing how long the pause will be.

Lastly, the presence of a river seems to induce a commander to plan and organize his attack more carefully and in more detail. He is also likely to pay more heed to his engineer advisor than he does ordinarily. It is this subject that I wish to address.

The Realities of River Crossings

The lessons which come through from all successful assault river crossings is the attention to detail and the critical importance of engineers

by MAJ Douglas J. George, RAE



M577 Command Vehicle crosses ribbon bridge

The recent publication of FM 90-13, River Crossing Operations, and the excellent article "Crossing the Main River" by Lieutenant Colonel Dennis K. Culp (Military Review, February 1980) suggest that it is time to review our doctrine. The quality of engineer advice is so critical in a river crossing operation that we must fully comprehend doctrine and its limitations. We might even try to improve it!

PLANNING—THE CRITICAL PART

If a deliberate crossing is envisaged, the division selected to do it should be pulled from the line to prepare for it. One could argue that this will not be possible in the next war, which is likely to be a fluid, mobile, and lethal affair. I would suggest that for any guarantee of success, the assaulting division will require time to prepare, especially if the selected division has been fighting defensively. As a bare minimum, it will require some reconstitution.

Most of the assets required for the division to deliberately cross a river will be provided by Corps. The only divisional engineer asset which will be involved in the rafting and bridging phases will be the bridge company of the divisional engineer battalion.

Corps Military Police (MP) assets will undertake traffic control tasks. If possible, Corps elements will provide Air Defense Artillery (ADA) protection and ground security. The logical deduction from this is that planning for support in the Crossing Areas (CAs) should be done by the headquarters which will control it. In essence, Corps elements do the planning for all aspects of a river crossing except the assault phase.

What sort of engineer elements will be provided for the division? Optimists would like to see a group headquarters to command all engineer assets. If a group headquarters is not available, a battalion headquarters is required. The selected battalion headquarters should be well-practiced in the planning and conduct of river crossing operations. Headquarters and Headquarters Detachments (HHDs) such as those which command the 559th and 565th Engineer Battalions, are the most logical choices because of their continuous intimate involvement in river crossings. The only shortcoming with this organization is that an HHD has a restricted and limited capacity for command and control. If these detachments were transformed into complete Headquarters and Headquarters Companies (HHCs), the capacity to plan, command and control river crossings from an engineer standpoint will be readily available.

The incoming engineer headquarters, called the Crossing Force Engineer (CFE) and staff, would undertake all engineer planning for the division crossing. The CFE's point of contact initially will be the Assault Division Engineer (ADE). The CFE will concentrate on the crossing area and the divisional engineer battalion will concentrate on supporting the assault battalions in the attack.

The primary reference for the engineer planning process is Appendix E of FM 90-13. It does have some shortcomings, the primary ones being:

—It takes no account of the maneuver commander's desire to cross his units organized for the battle.

—It provides an optimistic "operations research" type approach to determining how long it will take to cross.

—It suggests that amphibians in Division Troops, Division Artillery, and Division Support Command (DISCOM) will swim, even when rafts and bridges have been established.

Apendix E to FM 90-13 should be revised to reflect live constraints. The planning methodology is fine but it's a bit like a computer—you must feed in the correct input.

THE ASSAULT

Greater emphasis should be placed on the intial necessity to assault in pneumatic boats. Although swimming of amphibious vehicles is a more desirable method of assaulting, I suggest that it will rarely be possible. The Armored Personnel Carrier's (APC's) ability to exit from a river is, at best, very limited. Exit bank preparation will be required and will normally be achieved by troops crossing in pneumatic boats and working with hand tools. The first heavy vehicle crossed should be a bulldozer or CEV to further prepare the exit banks.

Another aspect of the assault which should receive

greater emphasis is the seizure of the far bank using vertical envelopment. River crossings require at least an air parity situation. Air superiority can be guaranteed for specific periods and this will be necessary for successful air assault. The time saved in securing the far bank will allow rafts and bridges to be constructed much earlier than normal.

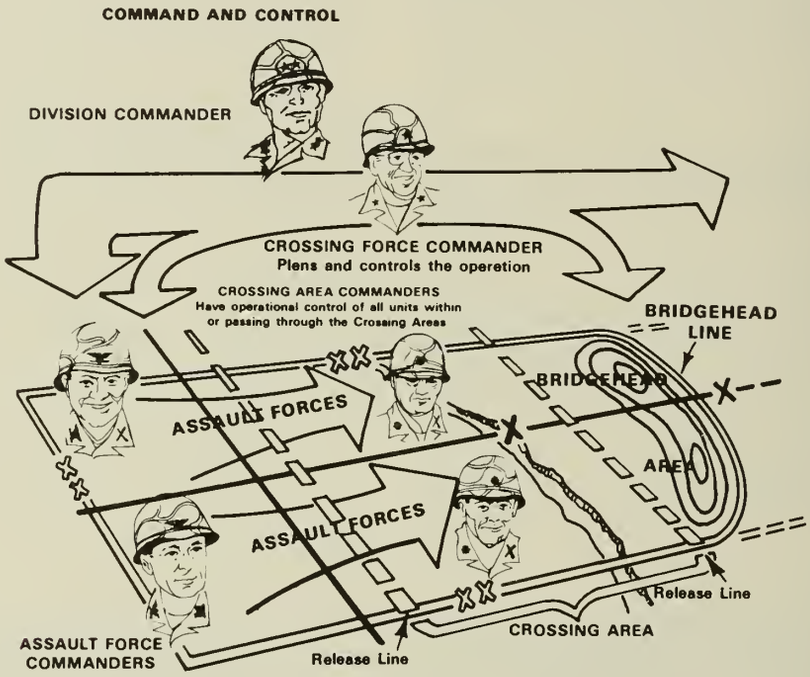
To raft or bridge is the question? Doctrine stresses the classic approach to crossing rivers; namely assaulting, then rafting, and then bridging. However, the ribbon bridge can be erected very quickly. A 100-meter gap can be bridged in 30 minutes. In the following 30 minutes, 100 vehicles, all tanks if you wish, can be crossed. Compare this with rafting with a similar amount of equipment. Assuming that sufficient ramp sections are available, four rafts can be constructed in 15 minutes. The next 45 minutes will allow five round-trips per raft, enabling a total of 20 tanks to be moved across. It becomes, therefore, a question of whether the maneuver commander is prepared to wait an extra 15 minutes before crossing any tanks.

The buildup rate with a bridge is so much greater that it is difficult to argue in favor of rafting. However, there are some additional considerations. Rafting at multiple sites offers an attacking force dispersion over a wider front. This makes it difficult for a defender to concentrate and defeat each small bridgehead. If you bridge, you have to concentrate, but so can the defender. The wider the river, the longer it will take to bridge, and the longer it will take to get heavy support weapons across to defeat enemy counterattacks.

It can also be argued that a bridge is far more vulnerable to air attack than a number of rafts. However, a bridge can be broken, moved 500 meters and reestablished in 30 minutes. *The real issue at stake here is that doctrine must be written in concert with the equipment available.* I'd go for a bridge and forget about rafting.

COMMAND AND CONTROL

During the planning phase, the Crossing Force Commander (CFC) will establish his HQ, called the Crossing Force HQ (CFHQ), near the Division Main Command Post (CP). Prior to the start of the operation, it will relocate close to the Division Tactical CP. The Tactical CP—not the Main CP, as suggested by doctrine—is more appropriate because the Tactical CP controls the battle and brigades which will be crossing.



The CFHQ should include the CFC, the CFE and his headquarters, ADA representatives, MPs, the transportation section from the Division G4 cell, and security element representatives. Current doctrine suggests that the Traffic Headquarters (TfcHQ) is a separate entity and not a part of the CFHQ. The saving in time and reduced amount of confusion which would be gained by making the TfcHQ part of the CFHQ would be substantial. Doctrine should reflect this.

Subordinate to the CFHQ will be the Crossing Area HQ, commanded by the Executive Officer of the Crossing Brigades and will normally consist of representatives of elements similar to those in the CFHQ. For example, if a Corps MP Company has been assigned to the division for the crossing, the Company HQ would be part of the CFHQ. Assuming that a platoon of the MP Company supports a crossing area, the platoon HQ should be part of the CAHQ.

From an engineer point of view, the command struc-

ture is simple (hopefully, it is always!). The CFE will command all engineer assets employed in the CA. The engineer HQ, subordinate to the CFE and located at CAHQ, will probably be provided by an Assault Float Bridge Company or a company from a Corps Combat Battalion. The most preferable solution would be to use the HQ of the Assault Float Bridge Company. It is larger than that of a line company and organically commands the platoons constructing the bridges and rafts. Communications with the crossing sites are also available if this structure is employed.

Doctrine suggests that the Assistant Division Commander (Maneuver) will be the Crossing Force Commander. At some time during the battle, he will want to cross the river. The question is when? And who will control the Crossing Areas after the CFC crosses the river?

The ADC(M) would logically cross the river once all the artillery has crossed. Most of the division's combat power would be across and the ADC(M) would be primarily interested in expansion of the bridgehead. The person who should control the CAs once the CFC moves is the Crossing Force Engineer (CFE). He will have an intimate knowledge of the CA because he and his staff will have done the detailed planning.

An additional reason is that he commands all the engineer assets in the CA which revert back to Corps control after the division crosses. He, therefore, provides the Corps Commander with the ability to regain control of the area. As a result, the transition from division to corps control should be smooth. Doctrine should address the handover of the CA.

It should be apparent that a large number of communications nets are required. In the crossings of the Main River by First Armored Division in Reforger 79, seven radio nets were employed in the Crossing Area, all of which emanated from one CA Command Headquarters. The electronic signature would be easily detectable. The potential use of tactical nuclear weapons on the integrated battlefield, currently being emphasized, makes such HQ very vulnerable.

The use of line, as suggested in current doctrine, therefore becomes a major contributing factor in the survival of the headquarters. The problem will *not* be a capacity to lay line; this can be done when all routes in the CA are marked. Insuring that sufficient line is available will be the prime consideration.

Traffic control is the backbone of the organization for a river crossing operation. It is the tool used to get units through the CAs as quickly as possible. It therefore deserves consideration.

Doctrine suggests that CACs have operational control of all units within or passing through the CAs. Logically, a Traffic Control Post (TCP) will be established at the boundary of the CA to give the CAC the required control. However, the CAC will need to know more than just when a unit reaches the boundary. He will want to know when a unit is moving.

There are two ways of communicating this. A TCP can be established at the Staging Area outside the Crossing Area. The major disadvantage of this is that it further increases the size of the traffic control net.

An alternative method is for the crossing unit to send a representative, probably the XO, to CAC HQ. This may negate the requirement for the crossing unit to join the CA command net. It also allows the crossing unit commander to focus his attention on his primary objective, the far bank.

The suggestion in current doctrine that Engineer Regulating Points (ERPs), be co-located with TCPs, has the advantage of reducing the requirement for engineer communications. This sounds fine in theory. However, the traffic control net is likely to be heavily loaded—a division has some 4000 vehicles. While a TCP and an ERP may be co-located, it would be preferable if the squad manning the ERP had it's own communications.

Routes also deserve further consideration. There will be return traffic, e.g., empty ammunition vehicles, ambulances, etc. A separate route should be established for return traffic. This will prevent congestion and confusion.

A last word on ERPs. The requirement to technically inspect vehicles prior to crossing to insure that they match the crossing means has been somewhat neglected, primarily because current bridging and rafting assets can carry any vehicle in the division. But this requirement should not be forgotten, because heavier vehicles than those within a division will eventually cross.

Is an ERP required at the crossing site, as doctrine suggests? The answer must surely be no. The command element of the engineer ogranization which constructs the crossing means will be at the crossing site. It will probably be a platoon headquarters. An ERP would be redundant.

CONCLUSION

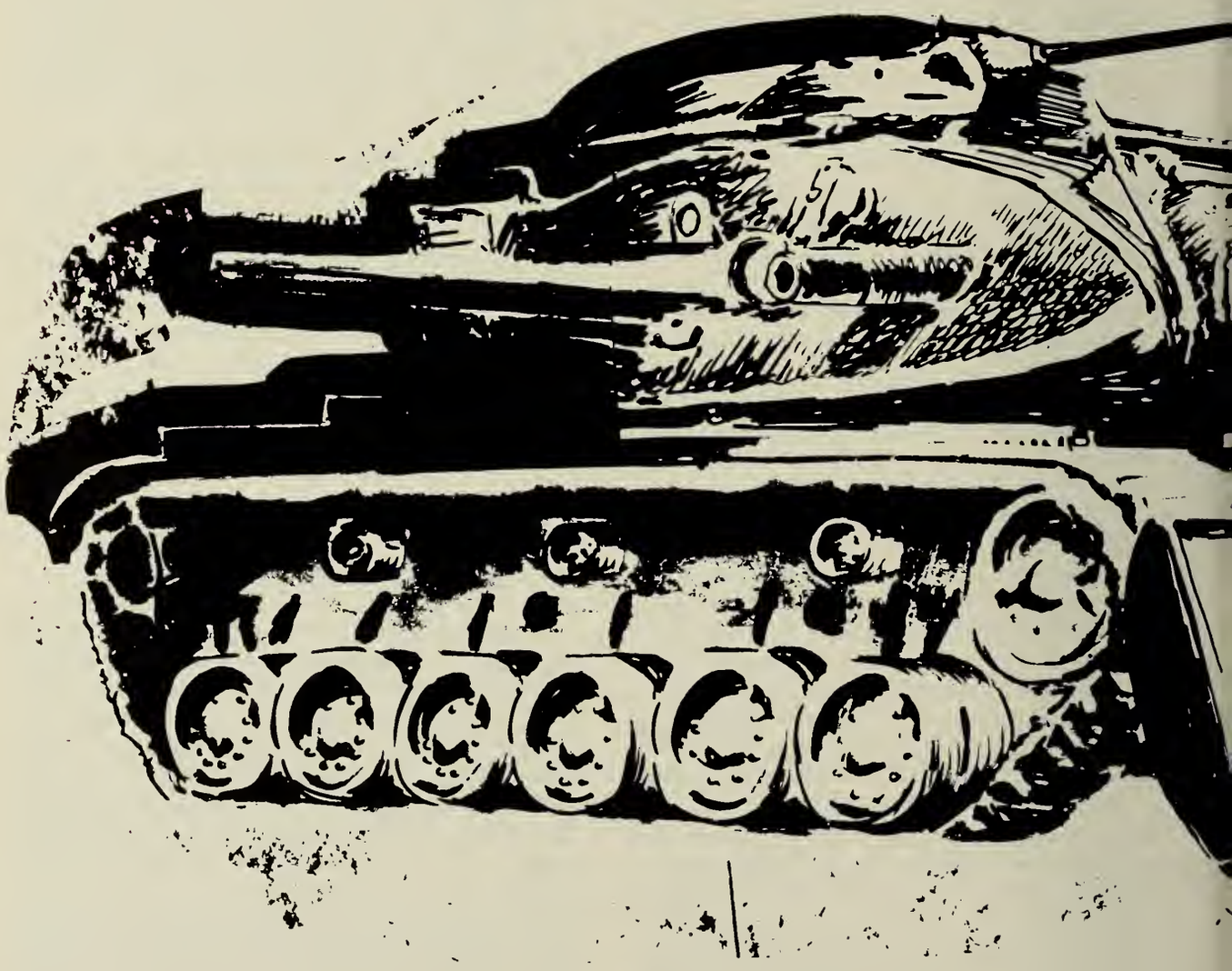
My intent is not to criticize FM 90-13, because I believe it is a good manual. There are some aspects, however, that require further consideration. Military history can be a good tutor and the lesson which comes through from all successful assault river crossings is the *attention to detail* required and the *critical importance of the engineers*. What I have attempted to do is emphasize some areas where more attention to detail is required. If you do no more than think about it, then I have achieved my aim.

Major Douglas J. George is the Royal Australian Engineer Exchange Officer at the US Army Engineer School, Fort Belvoir, VA. He is currently serving as Assistant Chief, Tactics and Operations Division, Department of Combined Arms, Directorate of Training, USAES.

Play It Again

Wargames simulations are tools to help the commander attain the unit efficiency needed to succeed on the next battlefield

by CPT Denis Gulakowski



The map sheet indicates Germany. Hunfeld specifically. A US armor heavy team occupies its battle position, waiting for lead elements of the approaching Soviet column to come within TOW range.

The first vehicles pass the invisible line that marks the beginning of the shooting gallery, but no defensive fires initiate. The PT 76s, the BMPs, and even the T-72s are ignored in anticipation of more lucrative targets. It is only when the BRDMs and roller-equipped tanks leave sanctuary that flashes erupt as TOW gunners acquire and engage. Artillery from both sides starts dropping as the contact heats up. The US combat ratio improves with the grass-hopping arrival of Sierra model TOW Cobras. Several vehicles are destroyed, many of them US . . . .

The map sheet changes. The blue combat engineer battalion symbol is grease penciled in close to the Imjin River. A startling number of red grease pencil symbols adjoins it, all too closely. Inside the Tactical Operations Center (TOC), the commander has assembled his principal staff, none of whom has slept in the last 16 hours. The Herman Nelson heater in the center of the TOC has long since died, another victim of the POL interruption, but the staff huddles around it from habit.

The commander hands out five manila foldered packets, which describe the latest mission. He requests a recommendation within one hour. Each individual accepts the packet and begins leafing through it to determine, among other things, what is preempting the planned hour of sleep.

Again the scene shifts, this time north to Alaska. A squad leader is planning a move to a job site which may very well be in hostile terrain and far from indirect fire support. The movement planning necessary includes troop transportation, relocation of materials, and route security. The task calls for a demonstration of critical leadership skills.

The leader estimates the materials he needs, checks his vehicle status, breaks down the load, determines distance to the job site, computes travel time, lists work tasks, selects personnel . . . .

Some might consider the aforementioned situations as fiction, events of the next conflict involving the US, or excerpts from Hackett's *Third Word War, August 1985*. Others might recognize them as typical examples of training in which they have participated.

The scenarios are realistic and fabricated deliberately to approximate the combat environment for which all soldiers ultimately train. They are presented in one of the fastest developing formats of army skill improvement programs. The scenes described are from three of the current wargames simulations that are receiving much emphasis and much interest, and are representative of what participants face throughout the exercises.

The first scenario represents routine action of a computer assisted engagement simulation known, surprisingly, as *BATTLE* (Battalion Analyzer and Tactical Training for Local Engagements). The purpose of *BATTLE* is to train soldiers in the combined arms concept and to integrate and represent all aspects of a 1980s battlefield. Inherent on such a battlefield are terrain use, weapons lethality and employment, task organization, tactics, logistics, and most importantly, coordinated interaction of all types of forces—maneuver, support, and service support. Through the realism of the third dimension and the speed of electronics, many factors are coalesced into a unique system that accurately represents combat.

BATTLE participants plot strategy

A three-dimensional scale terrain board becomes the battlefield and 1/285 scale miniatures serve as vehicles. Both US/NATO and Soviet Warsaw Pact Forces, including tanks, armored fighting vehicles, personnel carriers, antiarmor guided missile systems, air defense systems, attack helicopters, artillery, supply vehicles and, as promised, engineer vehicles are portrayed.

The exercise is what is known in systems design terminology as "open." That is, it provides for free play between two thinking, reacting forces, with input from the exercise causing subsequent behavior. Controllers merely serve as monitors (provided the players are skilled) and umpires to interpret rules or judge ambiguous circumstances.

The choice of scenario, too, rests with the participants or training unit, and the area or theater of operation is limited only by the terrain boards available. The detail and preciseness of the simulation is such that it allows direct fire engagement. For example, each individual weapon system that is found in units up to US Battalion/Task Force size and Soviet Regiment is provided. Similarly, indirect fire of mortars and howitzers is accurately portrayed.

If the term "computer warfare" comes to mind, it may be dismissed, inasmuch as the computer does not fight the battle, but merely does the bookkeeping for the exercise. With the appropriate input, the computer (a Wang VP 2200 and assorted peripherals) resolves direct fire engagements, assesses indirect fire results, states the outcomes of air-ground duels, maintains a running status on every system on the board, records ammunition expenditure, tallies personnel and vehicular casualties, and calls up visual and/or printed instant replay. It even allows participants to look ahead to see what will happen in a given situation. All outcomes are determined by performance tables, probabilities of hits and kills, systems characteristics, and lethality tables stored in the computer, rather than by the hot hand of a good craps shooter.

Within these *general* systems is a *specific* system of particular interest to engineers—realistic engineer play. The engineer tenets of mobility, countermobility, and survivability are depicted in the engineer rules supplement developed by The Engineer School. Obstacle employment, obstacle breaching, fighting position construction, and most other elements of combat engineering can be used as they would be on the battlefield. Miniscule Combat Engineer Vehicles (CEVs), Armored Vehicular Launched Bridges (AVLBs), and D7s are part of the force inventory, as are comparable Soviet assets. The accompanying data of employment times, clearing times, P_H, P_K, material requirements, and the like are also found in computer memory, so that engineer effort is correctly represented. After all, engineers are an integral part of the combined arms team.

BATTLE, unfortunately, cannot be found at the downtown games and hobby store, or even the local computer hobby center. In fact, anyone outside of Fort

WANG VP 2200 computer does the bookkeeping

Leavenworth, Fort Benning, Fort Knox, Fort Sill, White Sands, or Fort Belvoir, would be hard pressed to even find a *BATTLE,* let alone use it. The reason is that only at these locations does *BATTLE* exist, and, with the exception of Leavenworth and White Sands, only evaluation and testing is being conducted. Should tests prove the utility of the system, it may be expanded to other installations, including OCONUS where it can be tailored for specific local use. In any event, the possibilities of such a simulation are staggering.

What about the second scenario? Although it could be from a *BATTLE* exercise, it is not. Instead, it dramatizes a unit conducting a tactical taining exercise by using the innovative *Engineer Staff Exercise,* or *ESEX.* Three years ago USAES identified a need for a vehicle to provide meaningful training for engineer battalion staffs. At the time, there was little information available that established the elements of an effective and successful staff. There were volumes of what a good staff officer should do, how he should do it and why he should do it, as well as guidelines on the technical tasks of various staff positions.

But, military literature explaining why any army unit staff, let alone an engineer battalion staff, was successful, was virtually nonexistent. Therefore, prior to the development of techniques to train a staff to perform well, successful performance had to be defined. Fortunately, the research story has a happy ending. There was sufficient material of a comparable nature from the civilian sector and other services, coupled with intense research effort, experimentation, and information gathering, to yield a workable definition of critical staff functions, and later, the means to observe and measure these functions.

The end product, ESEX, scheduled for validation this year, will enable an engineer battalion commander to compose a staff effectiveness profile, comprised of specific strengths and weaknesses, and to train his staff to meet performance goals. The exercise is in three parts, Phases I, II, and III, identified as Individual, Collective and Combined. ESEX can be conducted in a garrison or field environment in as few as three sessions ranging in duration from two to four hours each. Based on the outcome of each phase, the commander can consult the performance improvement training recommendations, add his own experience and unit requirements, and devise his own program of staff training. As with *BATTLE, ESEX* is not available to the general consumer. If the validation and evaluation is as favorable as the preliminary response to the Phase I and Phase II prototype checkout, engineer battalions worldwide will have another training tool in the inventory by early next year.

The third scenario shows how simulation can enable lower echelon leaders to improve skills used in day-to-day unit operation. The two described simulations do not exercise the squad leader, platoon sergeant, and platoon leader on routine tasks, and consequently leave somewhat of a training void.

The answer for engineers is the Combat Engineer Game (CEG), a military and engineer mission knowledge game requiring demonstration of basic planning and organizing abilities. It is a "monopoly" type game, in that it uses a nontactical gameboard, as opposed to a terrain model or map, and game markers to designate units and types of transportation. From one to five players may participate independently or competitively, and can play the game virtually anywhere. Players draw typical engineer missions, based on SQT and ARTEP requirements, plan allocation of resources, and move to job sites by correctly answering questions. Once at the job site, the player is queried via question cards on technical aspects and requirements of the mission. He accumulates points for correct answers.

The numerous missions related to mobility, countermobility, and survivability provide a broad cross-section of tasks about which engineers should be knowledgable. The game serves as a measure of knowledge as well as a means of skill-improvement. It also provides a different approach to teaching and training first line supervisors. The good news is that production has begun and sufficient quantities should be available at the local TASC by October.

I have briefly described three recent efforts in wargames and engagement simulations that are being studied and/or implemented to train soldiers worldwide. A major concern is the cost and training effectiveness of any system being developed. Obviously more dollars are needed to buy the speed and sophistication of electronic hardware. But the ability to reproduce the battlefield and challenge the people who work on that battlefield without the expense of training ammunition, POL, schedule juggling, training area and range construction, and travel requirements is highly sought.

Simulations such as *BATTLE, CEG,* and *ESEX* are not the sole answer to better, more cost-effective training. They are merely tools to help the commander bring his unit to the level of efficiency necessary to succeed in the next battlefield.

Captain Denis Gulakowski is an Infantry Officer currently assigned as the Chief of the Analysis Branch, Collective Training Analysis and Design Division, Directorate of Training Developments, US Army Engineer School, Fort Belvoir, VA.

Beyond the Call

It was February 27, 1945. PFC Herman C. Wallace and several other members of the same unit—Company B, 301st Engineer Combat Battalion, 76th Infantry Division—were given the task of clearing enemy mines from a road near Prumzurley, Germany.

Suddenly, Wallace heard a sound which he had learned to fear, the sound of a mine being activated. He had stepped on the mine himself.

Wallace's first inclination was to dive for cover, but he must have known that such a reaction would mean certain death for the two comrades trailing in his footsteps and probable injury to many other comrades.

Without a moment's hesitation, Wallace placed his other foot on top of the enemy mine to prevent it from springing overhead to explode. Wallace was the only casualty.

He died instantly.

For gallantry in battle, PFC Wallace was posthumusly awarded that highest of military honors, the Medal of Honor. He became the tenth Army engineer in our history to receive the nation's most distinguished award.

The first engineer recipient of the Medal of Honor was Sergeant Major Frederick W. Gerber in 1871 and the most recent recipient was Corporal Terry T. Kawamura in 1969. Thirteen other Corps of Engineers officers and soldiers, including Wallace, were presented the Medal of Honor between 1871 and 1969.

Some of the 15 recipients, like PFC Wallace, were killed in action. And most of them were

SGM Gerber

1LT Wilson

1LT Gillespie

1LT Benyaurd

SGT Colyer

honored for a single, specific act of valor. But some, like Gerber, were honored for distinguished and faithful service over a period of years. Gerber received the Medal as a climax to 32 years of meritorious service to his country.

On the heels of Gerber's award came the Civil War, during which three more U.S. Army engineers were presented the Medal of Honor—Lieutenants John W. Wilson, George L. Gillespie, and William H.H. Benyaurd. Wilson and Gillespie each later served as Chief of Engineers.

Following the Civil War, more than half a century passed before the Medal was awarded to another Army engineer. It was during World War I, on October 9, 1918 when Sergeant Wilbur E. Colyer of Company A, 1st Engineers, 1st Infantry Division displayed courage and valor beyond the call of duty near Verdun, France.

Colyer single-handedly wiped out a group of German machine gun nests with grenades and the enemy's own weapons. He was later killed in action.

World War II Medal recipients included Private Junior Van Noy of Headquarters Company, Shore Battalion, 532nd Engineer Boat and Shore Regiment; Sergeant Joe C. Specker of the 48th Engineer Battalion; Technician 4th Class Truman Kimbro of Company C, 2nd Engineer Combat Battalion; PFC Wallace; and General Douglas MacArthur.

MacArthur, an engineer officer for 15 years of his distinguished military career, was cited for his conspicuous leadership against Japanese forces in the Pacific, including the defense of the Philippine Islands and the Bataan Peninsula.

PVT Van Noy

SGT Specker

T4G Kimbro

PFC Wallace

GEN MacArthur

Korean War Medal recipients included Sergeant George D. Libby of Company C, 3d Engineer Combat Battalion; PFC Melvin L. Brown of Company D, 8th Engineer Combat Battalion; PFC Joseph C. Rodriguez of Company F, 17th Infantry Regiment; and Corporal Dan D. Schoonover of Company A, 13th Engineer Combat Battalion.

The only engineer soldier to receive the Medal of Honor since the Korean War was Corporal Terry Kawamura of the 173d Engineer Company, 173d Airborne Brigade, during the Vietnam Conflict. Kawamura's heroic deed occurred on March 20, 1969 when an enemy demolitions team infiltrated the unit headquarters area at Camp Radcliff. His award, presented posthumously, states that he disregarded intense enemy fire and opened fire with his own automatic weapons. Passing up a chance to escape, he then threw himself on an enemy explosive to protect other members of his unit.

Gerber, Wilson, Gillespie, Benyaurd, Colyer, MacArthur, Van Noy, Specker, Kimbro, Willace, Libby, Brown, Rodriquez, Schoonover, and Kawamura.

Names to remember.

Some gave their lives, others total dedication, but all distinguished themselves "conspicuously by gallantry and intrepidity at the risk of life above and beyond the call duty while engaged in an action against an enemy of the United States."

SGT Libby

PFC Brown

PFC Rodriguez

CPL Schoonover

CPL Kawamura

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THE 7TH ENGINEER BRIGADE

Second a series of articles describing the history, organization, mission, and activities of Active Army engineer units

by MAJ Al Bornmann & SGM Larry David

Every military commander who ever engaged an enemy would have preferred to physically alter the battlefield in his own favor. In this respect, the first cave man to roll a stone into the path of his enemy may have pioneered combat engineering.

Rolling stones has not been eliminated from the combat engineer mission, but reconfiguration of the battlefield has grown vastly more technical. From defensive obstacles to airfields, roads, and bridges in support of the offense, today's combat engineers have the capability to alter the course of war.

Enter then, the 7th Engineer Brigade of VII U.S. Corps, located in southern Germany near France and Switzerland. The 4,300 men and women of the 7th Engineer Brigade comprise six battalions and two separate companies spread throughout the Corps area of operations (AO).

The 7th Engineer Combat Brigade was born of wartime need, activated on Biak Island, Philippine Islands as the 5202d Engineer Construction Brigade on June 16, 1944. The Unit participated in the New Guinea, Leyte, and Luzon Campaigns of World War II, earning the Meritorious Unit Citation.

Designated as the 7th Engineer Brigade on October 1, 1948, it moved to Fort Belvoir, VA. In the 1950s the Brigade relocated to Rhein-Main Air Base, Frankfurt, where it coordinated construction missions in Europe for the next 15 years. The most recent move occurred on June 14, 1969, when the Brigade moved to its present location at Ludendorff Kaserne, Kornwestheim, Germany, where it is currently commanded by Colonel Jerome B. Hilmes.

The 7th Brigade mission is to provide combat engineer support to VII Corps. It does this by enhancing the mobility and survivability of Corps maneuver units, and by degrading enemy mobility and flexibility. The Brigade is organized to accomplish its mission as shown in Figure 1.

To insure that troops are ready to fight and win the first battle, the General Defense Plan (or War Plan) was formulated as the driving force behind Brigade training. ARTEP tasks have been adjusted to specific unit war missions. Company and Battalion evaluations are conducted at least annually, and preferably during combined arms exercises. Evaluations of squads and platoons are conducted frequently to insure sustained combat readiness. Training has been decentralized to the lowest possible level, with NCOs supervising most of the training.

Creating road craters at Hohenfels

Combined arms training is maximized by participation in every maneuver Brigade, Division, and Corps FTX and CPX. Concurrently, each Brigade unit trains with a "Partnership" unit whenever possible.

Small unit training is anchored to annual programmed training activities at Brigade level, and includes an annual bridge training exercise, an engineer MTA period, the NBC Olympics, the

Combat Engineer Major Training Area Program, and major exercises directed by higher headquarters. Innovative training is encouraged.

The Brigade has made significant improvements in its Nuclear/Biological/Chemical (NBC) defense posture and is emphasizing full integration of NBC operations into training programs and ARTEPs. The culmination of this training is an annual NBC "Olympics." Competition includes both individual and team events, and Olympic style medals are awarded to the winners.

Among the more significant Brigade activities is the Combat Engineer Major Training Area Program, or CEMTAP. It begins in April and ends in September of each year. Each combat battalion is alloted one month at Brigade training areas to perform general mission training support of 7th Army Training Command. Each battalion conducts combat engineer training in areas and ranges of opportunity, such as the live demolitions range and the firing range. Additionally, the 563d Engineer Battalion spends two months upgrading and reinforcing tank trails at Grafenwoehr, and completing a variety of other road and range maintenance tasks. Last year, the Brigade's CEMTAP effort was six battalion months plus 12 reinforced platoon months, with a program cost of almost $1 million.

REFORGER 79 was the first large scale FTX in recent years that was conducted during winter months. More that 7,000 engineers from USAREUR, NATO, and CONUS participated. Every Brigade unit was committed during the exercise, since the Brigade was responsible for providing players, umpires, control and repair of maneuver damage, and construction support to include the Corps CTOC and the staging area for CONUS units.

In addition to the Brigade's dynamic training program, other initiatives have been taken to improve its ability to execute the GDP. Barrier and munitions stockage requirements were surveyed, shortfalls were identified, and repositioning actions were directed. The Corps' engineer task organization was revised to provide more engineers up front. The Brigade has held map

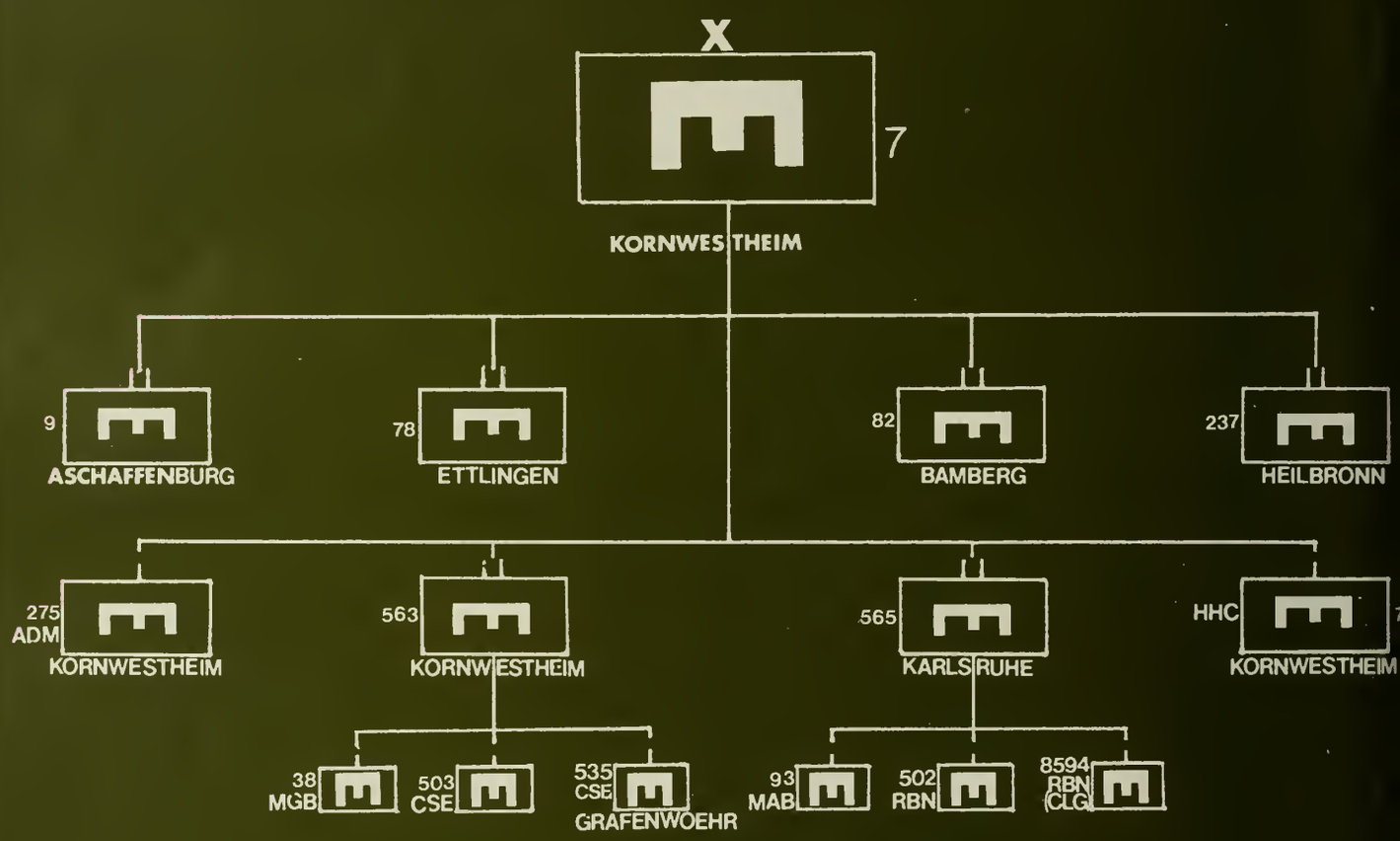


FIGURE 1

exercises, Class V upload, and barrier haul exercises to improve its ability to conduct barrier and denial operations well forward. Engineer control and organization in the maneuver brigade areas has improved with the use of a Brigade task force engineer (a major) who typically controls two engineer companies in each Brigade AO.

The Brigade has intiated several innovative programs to intensify individual training and increase the quality of life for its soldiers. Last year, it administered the performance-oriented components of the SQT for more than 1,800 Combat Engineers in VII Corps. The Brigade also applies the "team-building" concept in daily training and maintenance activities by requiring squads and platoons to undertake and complete difficult or dangerous tasks and to make important decisions at small-unit level.

In order to help the soldiers grow and prosper, a "How To Make It" program was developed. In brief, the program teaches new soldiers how to succeed as soldiers. It trains them to establish goals and it teaches personal assertiveness.

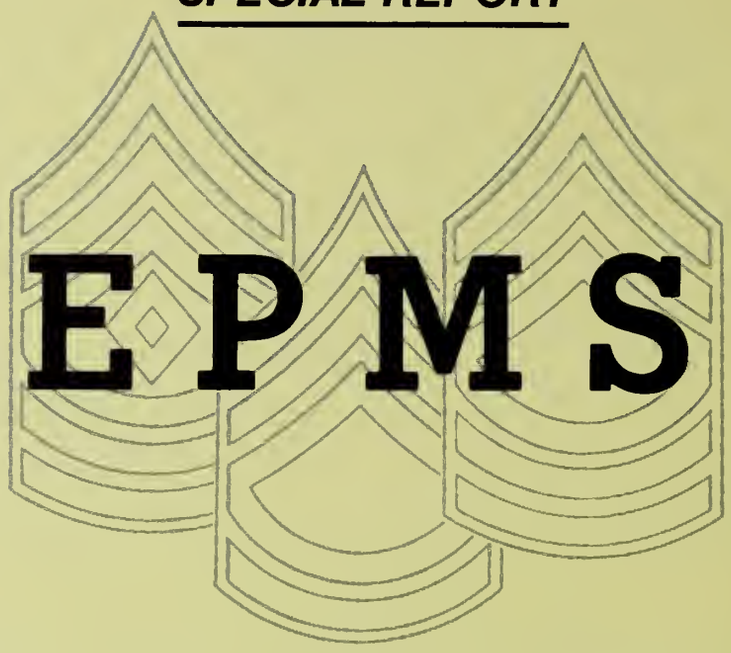
Another Brigade program, called "ACTIVE," is a barracks reach-in program designed to involve soldiers in healthy leisure activities during off-duty hours. It provides alternatives to drugs and alcohol, and "barracks rats" activities.

The future holds great things for the 7th Brigade. Mechanization for the combat battalions will improve their mobility and survivability on the battlefield. New equipment items are being developed and fielded which will improve the engineers' ability to support maneuver units. The quality and level of training is steadily rising. If you want to be where the action is, join the 7th Engineer Brigade, the Army's leader in Combat Engineering!

Constructing M4T6 Deck Balk Bridge with intermediate support

Major Al Bornmann is a former S-3 of the 7th Engineer Brigade. He is currently attending the Air Force Command and General Staff College. Sergeant Major Larry David is a former Operations NCO of the 7th Engineer Brigade. He is currently serving as the Senior Enlisted Advisor to the Adjutant General of Missouri.

SPECIAL REPORT



In 1974, the Army began overhauling the system used to train, test, classify, and promote enlisted soldiers. The project was called the new Enlisted Personnel Management System (EMPS). Many changes have taken place since then and more changes are forthcoming with the complete revision of AR 351-1, Individual Military Education and Training. This article is excerpted from a status report on EPMS prepared by the EPMS Task Force Office, Enlisted Personnel Management Directorate, US Army Military Personnel Center.

The Enlisted Personnel Management System (EPMS) is a professional development cycle which begins and ends with *training*. It includes an *evaluation* of what soldiers know about their Primary Military Occupational Specialty (PMOS) and a determination of how well they perform on the job. This is recorded through the submission of Enlisted Evaluation Reports (EERs). *Classification* and *promotion* serve to recognize the actual accomplishments and potential of those soldiers identified as the Army's best leaders.

TRAINING

Not much has been written about the details of the soldier's education system. This is training which is necessary to train NCOs to perform their jobs competently and to train them to train soldiers on their individual tasks. Because most individual training has to be done in units, the key to force readiness is to have trained NCO trainers.

Improvements in the Noncommissioned Officer Education System (NCOES) during the past five years were aimed at providing better quality training to match job requirements for all NCOs.

There are four *levels* of training within NCOES: primary, basic, advanced, and senior. *Primary* level training is skill level 1 training (E1 through E4) for skill level 2 (E5) duty positions. It includes the Primary NCO Course (PNCOC), the Primary Leadership Course (PLC), and the Primary Technical Course (PTC).

PNCOC is a combat arms leadership course for 16 MOS. PLC is also a leadership training course, but is designed for 253 combat support and combat service support MOS. PTC is an MOS proficiency training course designed for 23 additional combat support and combat service support MOS.

For example, Combat Engineers (MOS 12B10) would attend PNCOC, whereas Heavy Tractor Operators (MOS 62E10) and Crane Operators (MOS 62F10) are eligible to attend PLC.

NCOES *Basic* courses are designed to train E5s at skill level 2 for skill level 3 (E6) duty positions. Basic NCO Course (BNCOC) is a combat arms proficiency course for 14 combat arms MOS, while the Basic Technical Course (BTC) is tailored for 34 combat support and combat service support MOS.

Advanced NCO Courses are designed to train E6s at skill level three for skill level four duty positions at the E7 grade level. ANCOC is a combat arms proficiency course for 14 MOS, while ANCOC, CS/CSS is a proficiency course for 190 combat support/combat service support MOS.

Senior NCO Courses are designed to train E7s at skill level four for skill level five duty positions at the E8/E9 grade levels. However, senior NCO courses are virtually non-existent at present. Except for a few SNCOCs which cross many MOS (operations/intelligence, first sergeant, etc.), it has been determined through experience that the technical skills required for most MOS do not differ much between E7 and E8/E9 duty positions.

There is no requirement to develop an NCOES course for each skill level. That decision is left to the proponent service school. Training requirements for each MOS are different. Existing training plans reveal that for most MOS, resident training will be available *either* at the primary or the basic level, but not both. It appears that most MOS will have a resident ANCOC. Also, that there will be few, if any, resident SNCOCs.

In reality, most individual training takes place in units. Most of the training is provided by NCOs under the management of the company officers. Although technical and tactical proficiency is needed, it's not enough. NCOES must produce more trained trainers. To that end, service schools are putting the "train the trainer" tasks developed by the Army Training Board into the NCOES courses.

EVALUATION

The Enlisted Evaluation System (EES) provides information on how well soldiers are doing—individually and collectively. The system has two parts. The first is the Skill Qualification Test (SQT) which measures Primary MOS know-how. The second is the Enlisted Evaluation Report (EER), in which duty performance is evaluated. Thus, the EES measures actual day to day performance, as observed by supervisors (EER/SEER), and through PMOS-critical task knowledge (SQT).

THE SQT

Skill Qualification Tests (SQTs) are replacing the old MOS tests. In fact, MOS testing was terminated in January 1977. SQTs are aimed at tasks the soldier must do. Further, they are based on tasks listed in the Soldier's Manual for the grade the soldier holds.

SQTs are performance-oriented tests designed to evaluate the soldier's ability to perform the critical tasks required of that MOS at the skill level of the current grade. However, that's not the whole story. These tests are but one step in improving the overall readiness of the unit for combat.

SQT is a total concept of training, testing and follow-up training, which is the continuing aspect of the program. The retention aspect of trained tasks is also one of the key features.

Most SQTs include three components: A Skill Component (SC), which used to be known as the Written Component (WC); a Hands-on Component (HOC); and a Job-Site Component (JSC), which used to be known as the Performance Certification Component (PCC). SC tasks are aimed at testing the soldier's ability to perform critical tasks that are almost entirely mental. Different devices, such as TV tapes, will be used in addition to written questions to test this portion. HOC tasks test the soldier's ability to perform critical tasks on actual job equipment or simulators.

The JSC will allow a supervisor to observe and score a soldier's performance on certain other tasks during a period prior to the actual SQT date. This aspect is particularly critical because of the time and resource constraints surrounding test (SQT) day. SQTs currently being developed will be shorter, more easily administered, and will contain some questions in each of the components.

The Manual for Administration of the HOC (MAHOC), guide to setting up the HOC, is available for review and can provide added assistance, in that commanders can set up "practice" HOC situations.

In addition to preparing soldiers mentally to take the test, this procedure will also give them practice in performing critical tasks. Other valuable aids include the Commander's Manual (CM) and the Soldier's Manual. The CM describes for the battalion and company level commander his responsibilities in the overall training plan for a particular MOS. It lists all critical tasks for the MOS, study materials and references to conduct training, and includes information about where each task is taught (e.g., in training centers or units).

The Soldier's Manual lists for the soldier those critical tasks needed to perform satisfactorily at his present skill level and, to some degree, at the next higher skill level within his MOS. Additionally, it tells him eactly how to perform the tasks, and prescribes the standards which must be met. All tasks tested are lifted directly from the Soldier's Manual.

For the first-line supervisor, a Job Book is provided to aid in keeping track of the training and performance of his subordinates. The Job Book lists each critical task from the Soldier's Manual and provides columns for checking a *GO* or *NO-GO*, along with the date on which the NCO last checked the soldier's competence in the task.

Job Books are available for inspection or inventory by

those who have a "need to know." It is important that supervisors insure they are kept up to date, for their contents can be used as verification for JSC tasks. The first-line supervisor can also use the Job Book to insure that work experiences (another form of training) are being distributed among all the soldiers.

Prior to SQT day, unit commanders receive a roster for verification of individuals to be tested. He must insure that new arrivals are added to the roster and that departed soldiers are deleted. The commander also insures that all soldiers are interviewed to identify the appropriate track (if it is a tracked SQT) for which they must prepare. Track or career progression decisions should be made as early as possible for the benefit of the soldier.

On SQT day, the commander should insure that all eligible soldiers are available for testing. Unit details should be assigned to ineligible soldiers. Emphasis on specific Soldier's Manual tasks and insistance upon test attendance will have tremendous influence upon the test results and upon the ability of the unit's soldiers to perform in the "first battle" where MOS ability will be crucial.

Soon after the SQT answer sheets are forwarded by the TCO, the commander will receive an Individual Soldier's Report (ISR) indicating not only the score received by the soldier, but also a listing of the tasks not passed. The ISR comes in two copies—one for the soldier and one for the commander.

When the soldier is counseled on his SQT performance, he should be encouraged to pursue an individual training program to supplement the unit training program in areas of weakness. NCO supervisors can be a big help in aiding soldiers to improve in these areas.

SQT is a continuous and total program. A continuous review of the training program insures that needed background is given to each soldier so that when the "move out" order is given, each member of the unit can do the job. When every soldier knows how to do the job and is properly led, the mission will get done. That's what the Army is all about.

CLASSIFICATION

This part does not deal with awarding or classifying soldiers in an MOS as a result of service school completion, physical profiles, or enlistment options. Instead, it examines how the MOS award will be used to identify the level of competence of the soldier in an EPMS environment.

EPMS was designed to enable soldiers to demonstrate their potential for promotion through training and evaluation. Once this was accomplished, the Army needed some way to capture this information.

The device used to do that job—the glue which ties together training, evaluation, and promotion—is the Career Progression MOS (CPMOS).

The CPMOS is a new feature of EPMS, and all soldiers, except sergeants major, will have one. By definition, the CPMOS is that MOS to which all soldiers will progress when promoted. The steps of normal progression for each primary MOS, including MOS 12B10, 12C10, and 12E10, are pictured in the flow diagrams of AR 611-201.

The fourth digit of the CPMOS is the important one. If soldiers are not yet qualified for the next higher skill level, the fourth digit (which denotes skill level) will be a zero (example: 12B0). For qualified soldiers, the fourth digit will show the next higher skill level. For example, an E5, with a PMOS of 12B20 who has completed on-the-job experience (OJE) or NCOES and scored at least 80 percent "GO" on his SQT, would have a CPMOS of 12B30.

On-the-job experience is defined as service in a primary MOS for a period of time. It is necessary to provide an alternate means for soldiers to qualify for the awarding of a higher skill level in the CPMOS or for promotion, if the soldier cannot get to school or if the NCOES course has not yet been fielded for his MOS.

In sequence, the Soldier's Manuals tell what soldiers must be able to do; NCOES/OJE provides them with training to learn the skills of the next higher level; the SQT measures how well they know their PMOS; the EER measures how well they do their duties; and the Army recognizes the importance of trained soldiers to mission accomplishment by rewarding them for professionalism and potential through promotions.

The single biggest factor affecting promotion is what the Army needs in the soldier's Career Progression MOS.

PROMOTION

Soldiers who have successfully completed the training and evaluation process, and who have been awarded the CPMOS with the next higher skill level, are considered to have the skills and knowledge to perform at the next higher level. Provided they are otherwise qualified, they are fully eligible for promotion.

The single biggest factor affecting promotion is what the Army needs in the soldier's career progression MOS (CPMOS). The commander's recommendation, necessary time-in-grade, time-in-service, and education are all necessary factors to be considered in the promotion process. However, by proving ability to perform by scoring high on the SQT, soldiers can enhance their probability of promotion. There are three different levels of promotion: decentralized (E2-E4); semi-

centralized (E5 & E6); and centralized (E7-E9).

Promotions to grades E2 through E4 are controlled by local unit commanders. Certain waiver authority is authorized to that level, depending on the number of higher grade vacancies in the unit and on the number of soldiers assigned who could qualify, if a part of the time-in-service and time-in-grade requirements were waived.

Promotions to grades E5 through E6 are recommended by the field commander, but controlled by a DA cut-off score system. Promotions are determined by the number of promotion points in each MOS needed to meet or exceed the DA cutoff scores. Up to 300 promotion points can result from a combination of MOS knowledge (SQT results) and demonstrated duty performance. Soldiers in grade E4 can receive up to 150 points from their commanders, while E5s acquire points based on EER scores. The higher the Enlisted Efficiency Report Weighted Average, and the higher the SQT scores, the more promotion points will be awarded.

The new 1000-point worksheet provides more opportunity for the soldier of today to acquire points by doing better in those things he can positively influence, such as education, awards and decorations, and the evaluation process. A recent change to the semi-centralized promotion system allows soldiers who score 60 points or higher on their SQTs to compete for promotion. However, commanders can exercise one of their two waivers to recommend soldiers who score 59 or lower.

Promotions to grades E7 through E9 are centralized by DA selection board and based on the "whole person" concept. Promotion boards are very interested in PMOS proficiency (SQT results) and in the "comments" contained in the Senior Enlisted Evaluation Reports (SEERs). Soldiers competing for promotion to these grades are considered only with others holding MOS in the same career management fields.

As can be seen, EPMS did not change the authority level to promote. However, it did establish an SQT standard as one of the eligibility criteria for the semi-centralized promotion system. It also arrayed points derived from SQT results in such a way as to give the soldier with a good score a better chance for promotion.

At some future time, the SQT standard may be declared unwaiverable, for both the centralized and semi-centralized promotion systems. But this will not happen until tests for all MOS are available and valid, soldiers are trained, and the standard judged to be appropriate. Meanwhile, commanders and soldiers should not become complacent.

The final objective in promotions is to establish a realistic standard for soldiers to compete against, instead of competing against other soldiers.

There is one part of the promotion system that is understood by too few commanders and soldiers. Authorization document (MTOE and TDA) vacancies are not fully covered by the budget that pays for promotions. For example, the Army has approximately 1,800 E8 and 10,000 E6 and E5 positions which cannot be filled by soldiers in the right grade because the dollars are not available to pay for promotions.

Consequently, the more vacancies that exist in a given grade and MOS, the more promotions that skill will likely receive. Under the semi-centrailized system, *soldiers holding different primary MOS do not compete for promotion.* They only compete with others in the same MOS and grade.

It makes little sense to promote soldiers in an MOS with no higher grade vacancies while other MOS have many. Inflation of the grade structure in authorization documents sometimes work to the detriment of soldiers because "bottlenecks" are often created which cause promotions to go to other MOS, where the total of Army-wide authorizations is more feasibly structured.

As a result of the authorization/budget problem, the Army must insure that it promotes only the best qualified and most able soldiers. Under EPMS, promotion potential is best demonstrated through training and testing (SQT), as well as through the other evaluation (SEER/EER) and classification (higher skill level in CPMOS) indicators.

The final objective in promotions is to establish a realistic standard for soldiers to compete against.

SUMMARY

Soldiers must be trained to stay alive and to accomplish missions. Commanders must evaluate training to insure that, from an individual and collective standpoint, the Army's readiness is maintained. Finally, there must be some form of management that will allow for the professional development of the soldier.

This article has described the continuing program of individual training, evaluation, classification at the next higher skill level, and promotion.

Both commanders and soldiers share the responsibility for making these programs work. Soldiers must be aware of and seek the challenge and opportunities available. Each soldier holds the key to his own future.

Professional development is a continuing process throughout the soldier's career. Remember the four building blocks of professional growth:

- Training (NCOES, OJE)
- Evaluation (EER/SEER, SQT)
- Classification (CPMOS with higher skill level)
- Promotion

EPMS is a closed loop system that starts and ends with training.

Officer Career Info

OFFICIAL MILITARY PERSONNEL FILE

Reviewing and updating the OMPF, especially the Performance fiche, is important for every officer. This responsibility becomes even more critical when an officer is in the zone of consideration for either promotion or school selection. This file contains most of the documents considered during the selection process. Included in the OMPF are OERs, awards and decorations, and the official photograph.

Officers must ensure that a current photograph is included in their OMPF. The photograph provides the only means for the board to determine the officer's military bearing, appearance, and physical stature. These are important factors in considering the whole person.

Keeping the OMPF updated is essential. The task of maintaining this file should not be left entirely in the hands of the MILPO or MILPERCEN. You are one of the key managers of your file. With the conversion of the OMPF to microfiche, the job of reviewing and updating the file has become simpler. Officers may, and in fact should, request a copy of their OMPF within a month or two of the scheduled convening date of any board which will be considering them for either promotion or school selection. Officers may obtain a copy of their entire microfiche by writing to Commander; MILPERCEN; ATTN: DAPC-PSR-SR; 200 Stovall Street; Alexandria, VA 22332.

REORGANIZATION OF OPMD—PHASE II

Phase II of the reorganization of the Officer Personnel Management Directorate (OPMD) at MILPERCEN was initiated in April. It is part of a four-phase plan intended to provide officers with long term continuity in career planning and personnel management. The new organization of OPMD is shown in Figure 1. The plan does not include any changes in the structure of the Colonels Division or the Warrant Officer Division.

During Phase II, company grade divisions will be reorganized into three career management divisions —(1) Combat Arms Division, (2) Combat Support Arms Division and (3) Combat Service Support Division. Each officer's career will be managed by a single career division from entry on active duty until selection for promotion to colonel. For example, if an officer is assigned to Specialty Code 21, the Engineer Management Section will manage the individual's career in both of his specialty areas.

Each new career management division is organized with a Personnel Support Branch, responsible for maintaining individual files and processing requests for orders; a Personnel Actions Branch, responsible for changes in career status and the correction of records; a Professional Development Branch, responsible for formal training/education programs and monitoring assignments; and an Assignments Branch, responsible for assigning officers worldwide.

The Assignments Branch will be further organized into management sections. For example, the current Engineer Branch will become the Engineer Management Section. Figure 2 provides a complete listing of new management section titles.

The objective of Phase II is to establish smooth functioning divisions before integrating the Majors and Lieutenant Colonels Divisions into the new structure. While very few officers will be affected during Phase II, a review will be conducted to ensure that all company grade of-

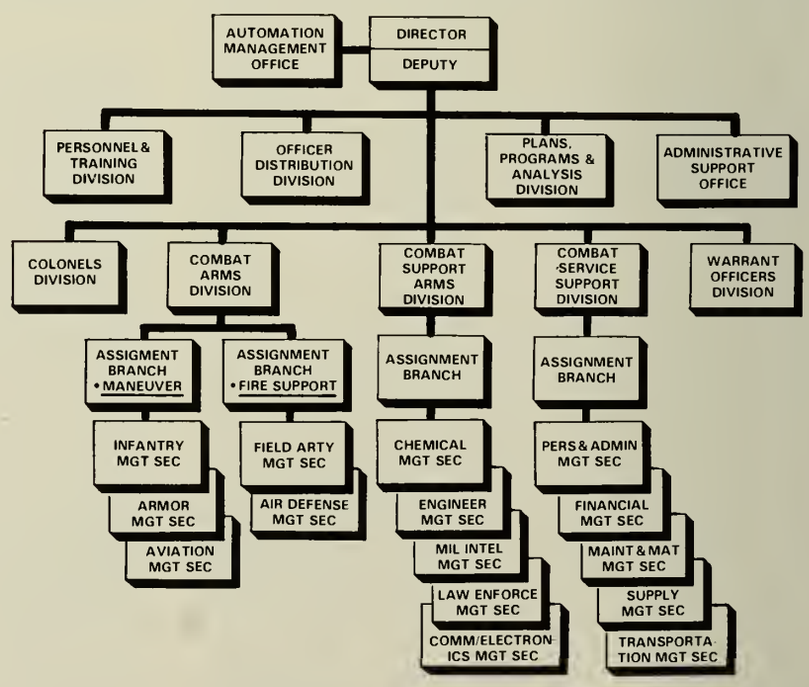


FIGURE 1

continued

ficers are managed by the appropriate division and management section within that division.

Generally, officers can expect to be managed by the division and management section which corresponds to their *basic* branch. However, in some cases, neither specialty is related to a specific branch. The records of these officers will be reviewed to determine which division and management section is most capable of managing the officer's career. Each of these officers will receive an official letter from OPMD explaining their assignment to a new management section. It will not effect the officer's basic branch designation.

Another objective during Phase II will be the transition to a single manager for the non-accession specialty positions. Presently, assignments to non-accession specialty positions are made independently by six different assignment divisions. When the new organization is fully implemented, one management section will coordinate all assignments of officers to positions coded with one of the non-accession specialities.

Figure 2 shows how the 27 accession and 13 non-accession specialties have been assigned to the new management sections. Sections responsible for non-accession specialties will have at least one officer assigned who holds the appropriate non-accession specialty. A major change resulting from the implementation of Phase II is that every assignment in a given specialty will be coordinated with the management section that has overall management responsibility for that specialty as shown in Figure 2.

During Phase III of the plan, the existing Majors Division will be incorporated into the new career management divisions. The existing Lieutenant Colonels Division will be incorporated into the new personnel management structure during Phase IV. The dates for Phases III and IV will be announced following successful implementation of Phase II.

The decision to reorganize OPMD was made last August as a result of a routine organizational management study. Phase I was initiated in January and consisted of the reorganization of the three functional divisions. Under the new structure, functional operations are being performed by a Personnel and Training Division, an Officer Distribution Division, a Plans, Programs and Analysis Division, and an Administrative Support Office.

The staff of OPMD is convinced that the reorganization will significantly enhance their ability to serve the officer corps.

SPECIALITY ASSIGNMENT CONTROLLER RESPONSIBILITY

COMBAT ARMS DIVISION	COMBAT SUPPORT ARMS DIVISION	COMBAT SERVICE SUPPORT DIVISION
INFANTRY MGT SEC:	CHEMICAL MGT SEC:	PERS & ADMIN MGT SEC:
11-Infantry	74-Chemical	*41-Personnel Management
*54-OPNS Force Dev	*52-Atomic Energy	42-Personnel Administration
ARMOR MGT SEC:	ENGINEER MGT SEC:	43-Club Management
12-Armor	21-Engineer	FINANCIAL MGT SEC:
*28-Training Developments	*49-ORSA	44-Finance
AVIATION MGT SEC:	MIL INTEL MGT SEC:	*45-Comptroller
15-Aviation	35-TAC/STRAT Intel	MAINT & MATERIEL MGT SEC:
FIELD ARTILLERY MGT SEC:	36-Counter Intel/ Humit	*51-Research & Development
13-Field Artillery	37-Elec Warfare	73-Missile Mat Mgt
*48-Foreign Area Officer	LAW ENFORCEMENT MGT SEC:	75-Munitions Mat Mgt
AIR DEFENSE MGT SEC:	31-Law Enforcement	76-Arm Mat Mgt
14-Air Defense	COMM/ELECTRONICS MGT SEC:	77-TK/GRD Mob Mat Mgt
*46-Public Affairs	25-CBT Comm-Elec	*91-Maintenance Mgt
	27-Com/Elec Engr	*97-Procurement
	*53-ADP	SUPPLY MGT SEC:
	72-Comm/Elec Mat Mgt	81-Petro Mgt
		82-Food Mgt
		92-Supply Mgt
		TRANSPORTATION MGT SEC:
		71-Aviation Mat Mgt
		87-Marine/Term Opns
	*DENOTES NONACCESSION SPECIALITIES	88-Highway/Rail Opns
		*95-Transportation Mgt

FIGURE 2

Officer Career Info continued

OERS PROGRESS REPORT

Early reports filed under the new Officer Evaluation Reporting (OER) System (DA Form 67-8) clearly indicate a conscious effort by rating officials to fulfill their evaluation responsibilities. One of the most encouraging improvements noted thus far is the writing of duty descriptions. Most reports contain a detailed summary of the rated officer's most important duties and responsibilities, emphasize specific functions required of the officer, and note conditions peculiar to the assignment.

Considerable improvement is also noted in the rater's narrative evaluation of the rated officer's performance (Part Vc). In most cases, the rater's comments in the performance narrative have focused on specific aspects of the rated officer's performance, including results achieved and the manner and degree of achievement. Should this trend continue, the new system will go a long way toward providing the type of narrative that DA selection Boards have been requesting.

A few reports have been returned for correction or improvement of the performance narratives. These reports fall into two categories: those which include comments on potential; and those whose narratives simply do not address the specifics of performance.

COMMAND TOURS EXTENDED

Recent revisions in the Centralized Command Selection System (CCSS) have resulted in the extension of Command Tour lengths for lieutenant colonels and colonels in both CONUS and overseas *long tour* areas to 30 months. The extensions are retroactive to 1 October 1979. Major Army Command commanders have authority to extend or curtail the command tours for up to six months for cogent reasons, such as timing of training, inspection or tests, follow-on assignments, and similar reasons with advance notice to MILPERCEN. The command tour length in overseas *short tour* areas both unaccompanied and accompanied, remains unchanged. These changes to the CCSS are designed to build unit cohesion, improve readiness, and provide more stability for soldiers in field commands.

PROMOTION BOARD GUIDANCE

An objective of the Officer Personnel Management System (OPMS) is that all officers be afforded the opportunity for dual specialty development as they progress through the field grade ranks. Attainment of this goal is sometimes precluded by the necessity for an officer to serve repetitive assignments in one specialty because Army requirements for that speciality exceed available personnel assets. When this condition exists, a specialty is classified as *underaligned*.

The basic goal of Officer Personnel Managers is to insure that adequate numbers of officers by grade and specialty are available to satisfy Army requirements. In recognition of this need, the 1980 Lieutenant Colonel (AUS) Promotion Selection Board which convened in March was provided Specialty Guidance which differed somewhat from guidance given in previous years.

At the beginning of its deliberations, the board was given the number of promotions needed, by speciality, to achieve an acceptable alignment condition. The purpose was to provide board members with an appreciation of the relative magnitude of underalignment by specialty. The data was *not* intended to be a selection quota. Board members were reminded that all eligible officers would be considered equally, regardless of OPMS specialty.

Specialty guidance is indicative of the increased emphasis on insuring that promotion boards are sensitive to Army requirements. Such guidance is intended to foster a positive environment which enhances individual professional development and ultimately contributes to increased unit readiness.

PROFESSIONAL REGISTRATION

The Chief of Engineers has continually expressed his desire for all engineer officers to become professionally registered. He forwarded a letter on the subject of professional registration to all specialty code 21 colonels and lieutenant colonels last September. In the letter, he established an objective that all District Engineers be registered by the summer of 1981. His objective also includes registration or "training" for all Deputy District Engineers by summer 1981. Approximately 50 percent of all specialty 21 colonels and promotable lieutenant colonels are currently registered professionally. Approximately 65 percent of all District Engineers are registered as Professional Engineers, while about 45 percent of all Facility Engineers (06s) are registered as PEs.

SSC/CSC SELECTION BOARDS

Separate DA Senior Service College (SSC) and Command and Staff College (CSC) screening boards will convene on or about 8 July to consider officers (other than JAG, CH, and AMEDD) for nomination to the respective 1980 SSC and CSC selection boards, which are scheduled to convene on or about 26 August.

Enlisted Career Info

TUITION ASSISTANCE

The Army will pay up to 75 percent of the tuition cost for formal education courses leading to an associate's, bachelor's, or master's degree, under provisions of the Tuition Assistance Program. Tuition assistance cannot, however, be used for courses beyond the master's degree level or for courses leading to a second associate's degree. In order to receive tuition assistance, enlisted personnel must have enough time in service remaining on their current enlistment to complete the course for which assistance is provided. Personnel who apply for and accept tuition assistance and then drop out for personal reasons, must reimburse the Army for the amount of the assistance. Personnel who drop out because of military reasons or because of illness, do *not* have to reimburse the Army. Check AR 621-5 or contact your local education center for additional requirements and/or information.

OMPF REVIEWS

Soldiers may now review their Official Military Personnel Files (OMPF) at their home stations instead of traveling to Fort Benjamin Harrison, IN. To obtain a copy of your OMPF, simply write to the Commander, USAEREC, ATTN: PCRE-RF-1, Fort Benjamin Harrison, IN 46249. Include your name, social security number and signature, and the address to which the record is to be mailed. Requestors should receive their OMPF copy within 15 days.

Soldiers who wish to review their records at Fort Harrison must make an appointment at least five working days in advance by calling AUTOVON 699-2657 or commercial 317/542-2657.

Individuals may update their OMPF by personally delivering authorized file material or by mailing it to Commander, USAEREC, ATTN: PCRE-FR-S, Fort Harrison, IN 46249. Only documents authorized by AR 640-10 will be put on the OMPF microfiche record. Documents received by mail that are not authorized will be destroyed. Soldiers should, therefore, check with their local Military Personnel Office to verify what material is authorized for filing in the OMPF.

NEW EER REG

AR 623-205 is the new consolidated regulation that governs the preparation and submission of enlisted evaluation reports (EER). It became effective in January and replaces Chapter 8 of AR 600-200 and DA Pamphlet 623-1. It follows the same format as recently revised regulations for the Officer Evaluation Reporting System (AR 623-105) and Academic Evaluation Reporting System (AR 623-1). The new EER regulation provides a single, easy-to-read reference source for both individual soldiers and the managers of the EER system.

REENLISTMENT CHANGE

Soldiers who fail their Skill Qualification Test (SQT) may still be eligible to reenlist under a change to the Army Reenlistment Program. The interim change to AR 601-280, effective 15 January 1980, allows a soldier's commander to certify that the individual is "qualified for continued Army Service" and eliminates a previously required waiver.

SQT UPDATE

Skill Qualification Tests (SQT) for all MOS will be revised in coming months. Major changes will include more emphasis on hands-on training and performance testing, single skill-level testing, and more timely feedback.

The Written Component will be renamed the "Skill Component" (SC) and will be much shorter than in the past. For combat arms E-1s through E-4s, it will be limited to one hour. For all others, it will be limited to two hours. The Hands-On component (HOC) of the test remains basically the same. However, commanders will be able to split the HOC into "bite-size" segments so it can be given more easily. An Alternate Hands-On Component in the form of a written test will be available for soldiers who cannot take the Hands-On Component because their unit does not have the necessary equipment for their MOS.

A new Job-Site Component (JSC), administered by first-line supervisors, will be added to the SQT, replacing the Performance Certification Component. The first-line supervisor will prepare the soldier and administer the on-the-job evaluation.

For combat arms soldiers, the largest part of the new SQT will be hands-on and job site testing. Combat support soldiers will have comparable hands-on, job site, and skill component testing. Combat service support soldiers will have an SQT made up of one-half skill component and one-half hands-on and job site testing.

Single skill-level testing has also been approved. In the past, about 25 percent of the SQT consisted of tasks from the next higher skill level. Now soldiers will be tested only at their current skill level.

The area of common tasks is also under study. Within the SQT, a number of tasks are common to every soldier. These tasks need to be standardized throughout the Army. A more efficient system is being developed to do this.

Reserve Components

NEW DISCHARGE POLICY

Soldiers getting out of the Army before completing their first enlistment could be transferred to the Individual Ready Reserve (IRR) instead of receiving a discharge, according to new Department of the Army policy.

The new policy applies to Regular Army, Reserve, and National Guard soldiers separated for such reasons as dependency, hardship, and inability to perform duties due to parenthood. Soldiers separating after completing basic training or at least eight weeks of unit training at one station may be transferred to the IRR to complete their six-year obligation.

EOAC DATES

Four phases of the USAR Engineer Officer Advanced Course will be conducted this summer at the US Army Engineer Center and Fort Belvoir, VA. Phases IA and IV will be conducted June 15–28 by the 3288 USAR School of Greenville, SC. Phases II and VI will be conducted July 6–19 by the 1036 USAR School of Farrell, PA.

Prerequisites for attending either session include:

- Membership in the US Army Reserve or Army National Guard
- Grade of first lieutenant or above
- Previous successful completion of the Engineer Officer Basic Course

Applicants who have previously completed EOAC will not be considered for attendance at either session of instruction. Applicants for Phase IA must have a Confidential Security Clearance, while applicants for Phase IV must have at least an Interim Secret Security Clearance.

Applications for Active Duty for Training should be processed through normal command channels. Detailed information regarding enrollment and/or instruction should be addressed to: Commandant, US Army Engineer Center, ATTN: ATZA-DTR, Fort Belvoir, VA 22060. Telephone commercial 703-664-4095 or AUTOVON 354-4095.

CAPSTONE PROGRAM

The Army Capstone Program has evolved from two separate but related programs: the Support Unit Improvement Program (SUIP), and the Wartime Mission/Utilization Program (WARM-UP). It is designed to link Reserve Component units with the Active Component units they will be expected to function with during wartime.

Capstone provides for direct interaction among geographically proximate AC and RC units for the purpose of improved training and overall readiness. The training association is technical in nature and will not circumvent or violate established command channels on matters of policy, command, control, plans, or funding.

The planning association of AC units with RC units provides the necessary interaction to conduct mission planning based on a wartime assignment to a specific gaining wartime command. Exchange of standing operating procedures (SOPs) and direct command and staff communications are encouraged.

The following group, or "package," of AC and RC units is typical under the Capstone concept:

420th Engineer Brigade, USAR, Bryan, TX

353rd Engineer Group, USAR, Oklahoma City, OK

299th Engineer Battalion, Fort Sill, OK

120th Engineer Battalion, ARNG, Oklahoma

875th Engineer Battalion, ARNG, Arkansas

The Capstone Program will ultimately define a basis for mobilization, stationing, and development of a peacetime Reserve Component force tailored for wartime employment.

INADEQUATE DRILL ATTENDANCE

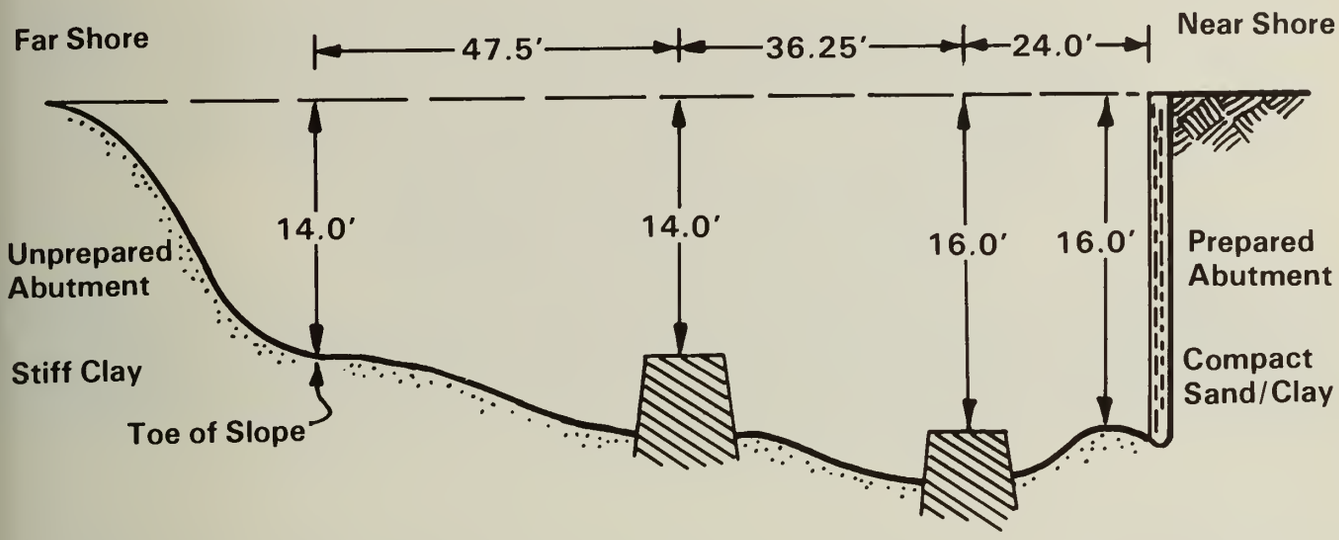
The Appropriations Committees of both the House and the Senate have expressed strong sentiment for punitive action against Reserve units which fail to achieve at least 70 percent attendance at IDT. The punitive action will likely be a denial of pay. The exact language implementing the action is not available at this time, but commanders should strive to achieve the highest possible attendance at monthly training sessions (RSUTA/RST) in the meantime.

ROTC SCHOLARSHIPS

The Army has awarded four-year ROTC scholarships to 867 more high school graduates for academic year 1980–81. These scholarships are in addition to those offered last October. Overall, the Army expects more than 1,000 scholarship recipients to enroll in Army ROTC this fall. The application period for academic year 1981–82 has been in effect since April 1 and continues until November 15. Applications may be obtained by writing to: Army ROTC, P.O. Box 7000, Larchmont, N.Y. 10538.

Our apologies to current and former members of the 18th Egineer Brigade, USAREUR, for depicting the Brigade's shoulder sleeve insignia upside down in the Spring issue. We regret the error and appreciate the concern and interest of the many readers worldwide who let us know of the mistake.

Engineer Problem



As a result of recent inclement weather, a local community in the Hanau area has been denied the use of an important road link. The major problem was created by a flash flood which destroyed all but the pier foundations of the only Class 60 bridge spanning a small river on the outskirts of the community.

The local crisis did not pass unnoticed by U.S. Army engineer personnel stationed within the Hanau area, who have maintained an excellent relationship with the local German populace. At a recent cocktail party, the Brigade commander requested assistance from the commander of the 559th Engineer Battalion. The 559th commander, in turn, tasks you, as the commander of the 516th Engineer Company, to provide a solution to the crisis. He gives you the following information:

- An initial reconnaissance of the destroyed bridge site revealed the gap profile shown above.
- A Class 60 facility is required.
- An unlimited amount of Bailey Bridge is available from stock.
- If a multi-span bridge is designed, the piers must be of Bailey Bridge components.
- Conversion sets #3 are available, but there is no cable reinforcement.

Your greatest concern is that your company has been equipped with the Medium Girder Bridge for five years, and there is very little expertise on Bailey Bridging within your unit. Nevertheless, your mission is to design a Bailey Bridge that will carry Class 60 wheeled traffic, and to provide at least one alternative design.

You inform your platoon leaders that approximately one platoon (+) is available for site preparation and construction. Since you feel this is an opportunity for them to gain experience, you insist that they satisfactorily justify their selected design. Your only other instructions to them are that they have seven days to complete the task.

See THE SCHOOL SOLUTION, page 40

The School Solution

CONSIDERATIONS	SOLUTION #1	SOLUTION #2
DESIGN	Simple Span	Multi-span continuous with Standard Bailey Pier erected on far shore existing pier
SPAN LENGTH	Gap + roller clearance + Safety Setbacks 107.75' + 2(2.5') + 3.5' + (14× 1.5') =137.25'	Span A=36.25' + 24' + 2.5' + 3.5' = 66.25' Span B = 47.5' + 2.5' + (14 × 1.5') = 71'
TYPE CONSTRUCTION Design length	Rounded to 140 feet	Span A rounded to 70 feet, Span B rounded to 80 feet
Capacity Truss type	Class 70/70 Double triple	Class 80/80 Triple Single
GRILLAGE Near Shore	3 Tons per square foot = Type 4,5,7,8 = roller clearance =3.5'	3 Tons per square foot = Type 3* = 3.5' roller clearance
Far Shore	1.5 Tons per square foot = Type 7,8 = roller clearance = 3.5'	1.5 tons per square foot = Type 6,7,8 = 3.5' clearance (Select Type 6)
PIER REACTIONS	N/A	70' – 80' = (172* + 167)/2 = 169.5 tons (* Select worst case)
PIER SELECTION	N/A	Reaction required = 169.5 tons Lift required = 14' (Select pier as at Figure 17-33, FM 5-277, with all trusses loaded and crib up 7'')
ADVANTAGES	No pier required	Single story construction Requires less numbers to construct
DISADVANTAGES	Triple storey construction involving difficult technique Required work force exceeds available work force	Requires construction of pier

The major concern must be that of expertise and total manpower available. Therefore, a triple-single design would be much less of a problem than a double-triple. With a construction deadline of seven days, there is ample time to establish a unit training familiarization program to adequately deal with the practical aspects of the task, including pier construction. Although the numbers available are less than desired for either alternative, they will weigh heavily in favor of single-story construction.

There are, of course, other alternatives, including a broken span, and reinforcement by adding a partial story or supplementary chord to a double story bridge. Both of these alternatives are rejected primarily because of technique and time considerations.

To complete the recommended alternatives, and insure that sufficient components are demanded, we must consider the launch design and total numbers of rollers, bearings, templates, etc., required.

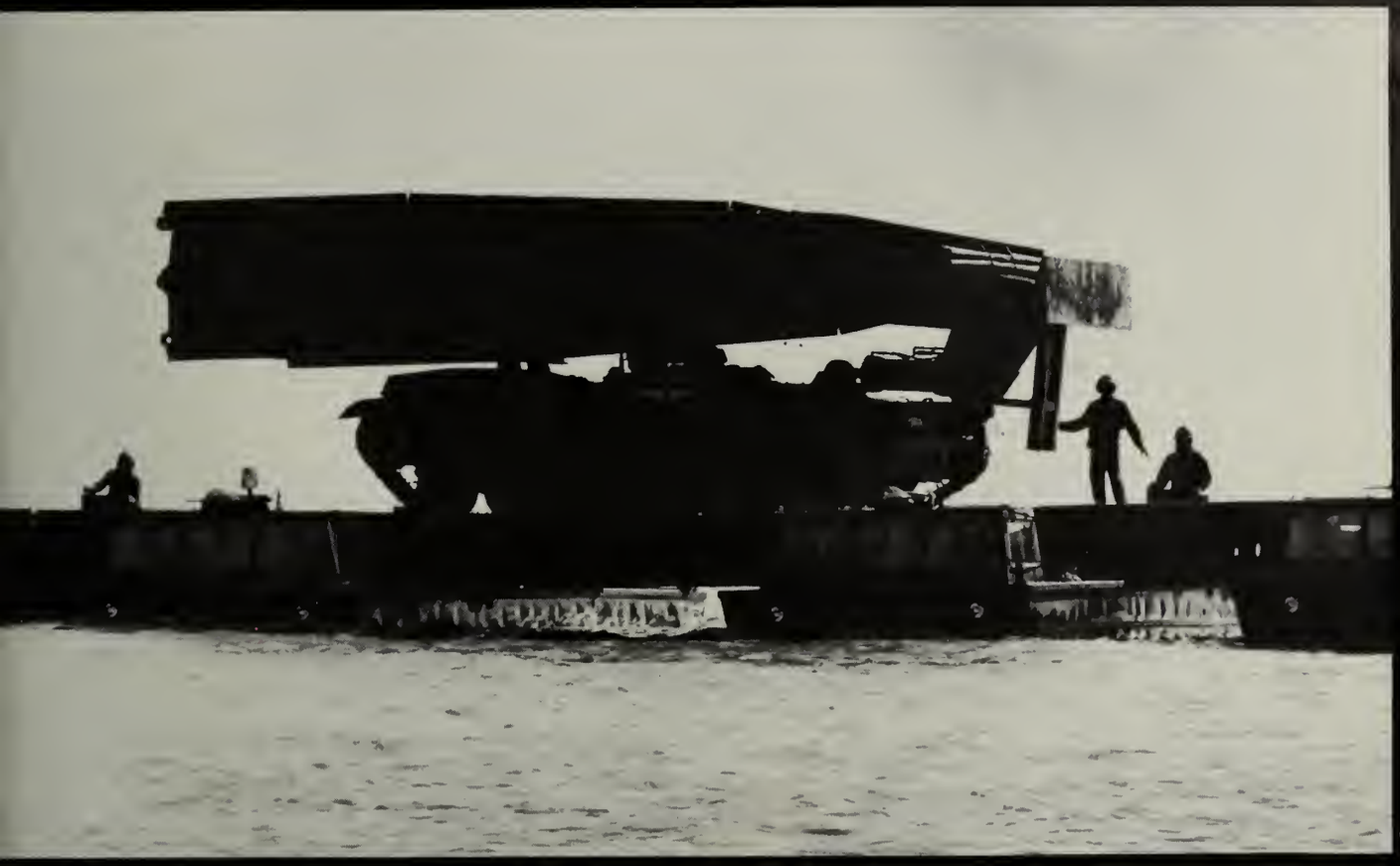


PHOTO OF THE QUARTER

PFC N.P. Lang shot this photograph of an Assault Vehicle Launched Bridge (AVLB) being transported by a Mobile Assault Bridge (MAB) during a recent bridging demonstration by the 902d Engineer Company (FB) at Fort Belvoir, VA. Engineer soldiers and equipment are silhouetted against a thick cloud of defensive smoke. ENGINEER Magazine will publish the most outstanding engineer training photo submitted each quarter, so the next time your unit conducts training, ask someone to take a few black and white shots and send us your best one. Your help is needed to make Photo of the Quarter *a regular feature of ENGINEER.*

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"In the final analysis, the Army's state of readiness depends upon its most important element, the people who are the Army."

—Clifford A. Alexander
Secretary of the Army

8.205

ENGIN

Engineer

THE MAGAZINE FOR ARMY ENGINEERS

FALL 1980

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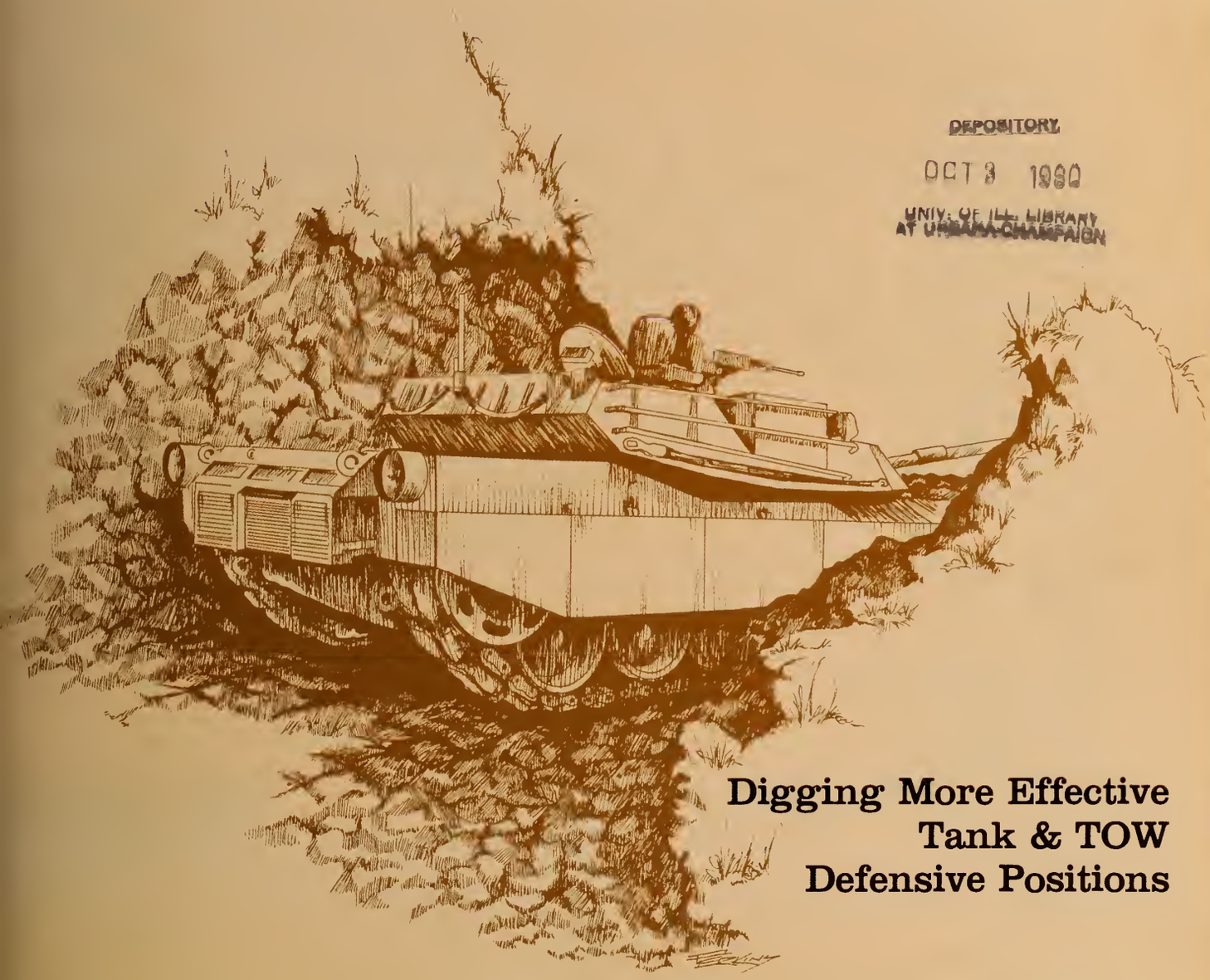

Digging More Effective Tank & TOW Defensive Positions

UNITED STATES ARMY ENGINEER CENTER AND FORT BELVOIR

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CHIEF OF STAFF/DEPUTY INSTALLATION COMMANDER
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ASSISTANT COMMANDANT
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THE COVER

Better concealment and greater killing effectiveness of antitank weapons are possible by digging defensive positions deeper and facing them alternately left and right to take advantage of flank shots, as illustrated on the cover by Ron Perkins. For details, see Captain Eric T. Mogren's article beginning on page 10.

Engineer

THE MAGAZINE FOR ARMY ENGINEERS

VOLUME 10 FALL 1980 NUMBER 3

FEATURES

10 DIGGING MORE EFFECTIVE TANK & TOW DEFENSIVE POSITIONS
by Captain Eric T. Mogren

13 PROJECT KRYPTONITE
by Captain Norman G. Comstock

16 THE DIVISION ENGINEER IN THE GERMAN ARMY
by Lieutenant Colonel Juergen M. Erbe

18 THE TERRAIN ANALYSIS CENTER
by Captain David R. Gallay

20 THE 20TH ENGINEER BRIGADE

24 ROAD CRATERS—TECHNICAL & TACTICAL CONSIDERATIONS
by Captain Robert D. Volz

32 THE NONCOMMISSIONED OFFICER
by CSM (Ret) Johnny W. Greek

page 13

page 20

page 29

DEPARTMENTS

4 NEWS & NOTES
8 FORUM
35 ENGINEER PROBLEM
36 RESERVE COMPONENTS
38 ENLISTED CAREER INFO
39 THE SCHOOL SOLUTION
40 OFFICER CAREER INFO

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NEWS & NOTES

NEW CHIEF OF ENGINEERS

Lieutenant General Joseph K. Bratton will become the Army's 45th Chief of Engineers on October 1. He will succeed Lieutenant General John W. Morris, who retires September 30.

Bratton has served as Deputy Chief of Engineers since August 1. He was the division engineer of the Corps of Engineers' South Atlantic Division at Atlanta, GA, prior to August 1.

Bratton's command assignments have included the 24th Engineer Battalion with the 4th Armored Division in Europe, and the 159th Engineer Group in Vietnam.

His staff assignments have included director of military application for the Department of Energy; chief of nuclear activities, Supreme Headquarters, USAREUR; executive to the Supreme Allied Command in Europe; secretary to the Joint Chiefs of Staff; and military assistant to the Secretary of the Army.

He has also served in the War Plans Division, Plans Directorate, Office of the Deputy Chief of Staff for Military Operations; and with the Division of Reactor Development, Atomic Energy Commission.

ENGINEER HOTLINE

The US Army Engineer School at Fort Belvoir, VA, has a telephone *HOTLINE* to help provide answers for specific Army Engineer problems in the field. If you experience problems related to engineer doctrine, TOE organization, MOS, equipment, manuals, training and/or training development, call the HOTLINE number, AUTOVON 354-3646 or COMMERCIAL 703-664-3646. A recorded message will ask you to identify yourself by name, unit, unit address, and unit telephone number. Then you will be required to identify the subject area of your problem and state the problem as clearly as possible. Subject matter experts within The Engineer School will then be contacted about your problem and return your call. HOTLINE has responded to an average of about 20 calls a month during the last year. If you have a problem, call the Engineer HOTLINE.

WEST POINT WOMEN CHOOSE ENGINEERS

The first women to graduate from the United States Military Academy at West Point include six engineers currently enrolled in the Engineer Officer Basic Course at The Engineer School, Fort Belvoir, VA. They were among the 61 women commissioned as second lieutenants during graduation ceremonies at West Point in June. The six precedent-setting engineer lieutenants include Brigid Benya, Bobbi L. Fiedler, Kathleen M. Gerard, Clare Kirby, Debra M. Merriken, and Carol A. Young. Benya and Kirby have been assigned to the 130th Engineer Brigade, USAREUR, following EOBC, while Young has been assigned to the 7th Engineer Brigade, USAREUR. The other three will report to stateside commands following completion of EOBC—Fiedler to the 937th Engineer Group, Fort Riley, KS; Gerard to the 20th Engineer Brigade, Fort Bragg, NC; and Merriken to the 36th Engineer Group, Fort Benning, GA.

continued

NOAH SUCCEEDS KELLY

Major General Max W. Noah has succeeded Major General James L. Kelly as Commanding General of the US Army Engineer Center and Commandant of the US Army Engineer School at Fort Belvoir, VA. MG Kelly retires from active service on September 30 after a distinguished 30-year military career.

MG Noah last served as Division Engineer for the Corps of Engineers' Huntsville Division in Huntsville, AL. He was previously assigned to the US Army Training and Doctrine Command at Fort Monroe, VA, as Deputy Chief of Staff for Resource Management.

MG Noah is a 1953 graduate of the US Military Academy at West Point. In 1958 he received a master's degree in electrical engineering at Purdue University. He also is a graduate of the Army Command and General Staff College, the Army War College, and the Institute of Defense Analysis.

MG Noah's 27-year military career includes two tours in Korea (1954-55, 1973-74), a tour as chief of operations for the 18th Engineer Brigade in Vietnam (1966-67), and a tour as commander of the 307th Airborne Engineer Battalion, 82nd Airborne Division, at Fort Bragg, NC (1968-70).

The Greensboro, NC, native is a registered professional engineer in the state of New York.

SOLDIERS EARN OLYMPIC MEDALLIONS

Displaying official Olympic medallions they received for their part in the Winter Olympics at Lake Placid, NY, are SP6 Clark J. Heinkel, SFC Joseph T. Tenschert, and SP6 Marshall R. Thacker. All three are members of Team C, 535th Engineer Detachment, Fort Eustis, VA. They assisted in providing backup electrical power at Lake Placid in February. Their performance also earned them certificates of appreciation from the Secretary of Defense.

NEW BORE CLEANER

A new product, now available to units through the national military supply system, not only breaks loose grit, rust, salt, etc., from metal surfaces but also lubricates and preserves them by providing a long-lasting thin film protective coating. This new product, called Break-Free CLP (cleaner-lubricant-preservative), is produced by the SAN/BAR Corporation of Santa Ana, CA.

Break-Free was first used to clean primer vent holes, which ordinarily clog up with hard residue after seven or eight rounds, requiring the use of a mechanical reamer. Not only did the solution do the cleaning, but it also extended the time for the next cleaning to 17 or 18 rounds.

The moisture-displacing film deposited by the Teflon-based Break-Free compound is less likely to break down under heat and pressure as have other oils and lubricants. Nor does it attract dust, grit, and powder residue, a principal limitation of other lubricants and penetrating oils.

News & Notes

NUMBERS GAME

Topographic Engineers of the 649th Engineer Battalion, 18th Engineer Brigade, stationed at Tompkins Barracks, Schwetzingen, Germany, commemorated Armed Forces Day in an especially fitting manner. At precisely 6:49 a.m., First Sergeant John Miller was reenlisted by 649th Engineer Battalion Commander Lieutenant Colonel Daniel R. Clark. Miller was the 18th soldier in the battalion to reenlist this fiscal year. The battalion commander and Command Sergeant Major Jimmie L. Christensen then led a team of 118 topographers on an 18 kilometer march to honor the reenlistment. The march started 18 kilometers north of Karlsruhe, home of the 18th Engineer Brigade headquarters, and followed a scenic route analyzed, plotted, and surveyed by the 649th Engineer Battalion terrain analysts. The march ended at the 18th Engineer Brigade's Armed Forces Day river crossing and engineer equipment display site at the Rhine River Harbor (Rheinhafen) in Karlsruhe. The marchers carried 18 flags and completed the march in six hours and 49 minutes. Reenlistment receives a lot of attention in the 649th Engineer Battalion and results seem to indicate that attention pays off.

HUMANITARIAN SERVICE MEDAL

More than 3,000 soldiers are eligible to receive the Humanitarian Service Medal for their participation in the cleanup operation on Enewetak Atoll, the Pacific site of earlier US atomic tests. The Defense Nuclear Agency was responsible for the cleanup and was the agency that approved award of the HSM to all participants. Soldiers who have questions concerning their eligibility for the medal for that operation should address their inquiries through command channels to: HQ, Defense Nuclear Agency, Washington, D.C. 20305. Criteria for the HSM for the Eniwetok operation include direct, meritorious participation for at least 24 continuous hours between January 24, 1977 and April 15, 1980, the official end of the cleanup.

ESSAYONS RETIRED

The Army Engineers hopper dredge *ESSAYONS*, which helped clear the Suez Canal of damage suffered in the 1956 war, was retired last Spring. The vessel, the flagship of the US Army Corps of Engineers dredge fleet, took part in many epochal engineering events in both continental United States and foreign waters. Its name is the motto of the Corps, which translated from the French, means "Let us try." Commissioned January 16, 1950, after being completed at the Sun Shipyards in Chester, PA, it was the largest in the Corps fleet, with a length of 525 feet. Its capacity was 8,270 cubic yards and its speed while loaded was 12 statute miles per hour. The place at the head of the Corps dredge fleet vacated by the *ESSAYONS* will be filled by a modern large class hopper dredge under construction in New Orleans. Chief of Engineers Lieutenant General John W. Morris, said the *ESSAYONS* was retired because the dredging industry has demonstrated an ability to take over more of the workload which previously has been accomplished with Corps of Engineers equipment. The Corps is phasing out the older dredges in the Corps fleet as industry's dredging capability increases.

COLD WEATHER TRAINING

Members of Company A, 7th Engineer Battalion, 5th Infantry Division (Mech), offload rail cars at Fort Drum, NY, during exercise "Winter Raider 80" last winter. Company A personnel and equipment were deployed to Fort Drum with the 1st Brigade of the 5th Infantry for cold weather training. The P&H crane above unloaded more than 200 conexes and engine crates during the deployment and repeated that performance during the redeployment. (US Army photo by 1LT Matthew P. Saitta)

CODE-A-PHONE FOR ACCP

The Army Institute for Professional Development maintains a 24 hour Code-A-Phone service on AUTOVON 927-3085. This line may be used by any individual having questions about the Army Correspondence Course Program or services performed by the Institute for Professional Development, the Army manager of the Army Correspondence Course Program.

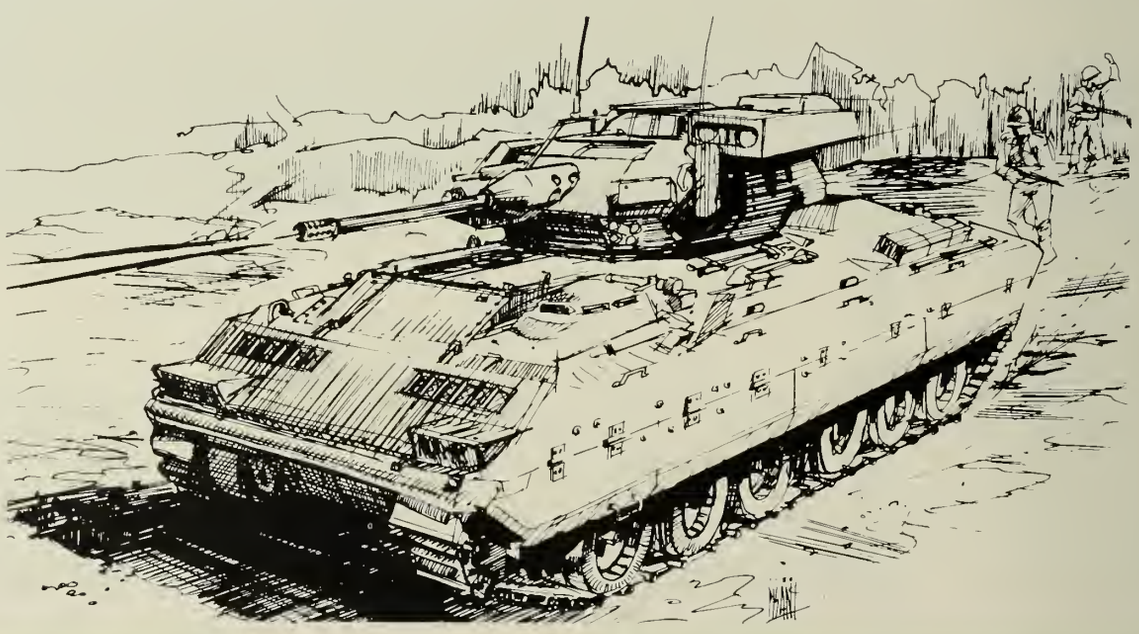
ENGINEER COURSE

The Engineer Army Correspondence Course Program has moved to Newport News, VA. Inquiries and applications concerning non-resident instruction should be addressed to the Institute for Professional Development, US Army Training Support Center, Newport News, VA 23628.

NEWS & NOTES

FIGHTING VEHICLES

The M2 Infantry Fighting Vehicle (IFV) and the M3 Cavalry Fighting Vehicle (CFV) will replace the M113 Armored Personnel Carrier (APC) in mechanized infantry and armored cavalry/scout units beginning next year. Officials say the fighting vehicles are perfect companions for the new XM1 "Abrams" Tank. The IFV will be the first US combat vehicle that provides infantrymen with the ability for a mounted attack. The IFV and CFV have numerous advantages over the APC. A combination of engine performance, power train efficiency, and improved suspension increases their battlefield mobility. They have a top road speed of 41 mph, a cruising range of 300 miles while loaded for combat at 48,000 pounds, and the Cummins four-cycle turbo-charge engine can power each vehicle from zero to 30 mph in about 19 seconds. The hydro-mechanical transmission allows the driver of each vehicle to operate in a variety of terrain. With a stabilized 25mm cannon, 7.62mm coaxial M240 machine gun, and TOW antitank guided missile system, the fighting vehicles have more firepower than the APC. Also, the IFV has six ball-mounted XM231 5.56mm firing port weapons. Other improvements include the fighting vehicles's "swimming" ability, increased armor protection for the crews, and the advanced automatic Halon fire extinguisher system located in the engine and crew compartments. About 7,000 fighting vehicles have been programmed for production over the next few years.



UNIT CONSOLIDATION

Two battalions of the Engineer Training Brigade (ETB) at Fort Belvoir, VA, were consolidated into one battalion in August for the purpose of more effectively utilizing assigned personnel and equipment. The 1st and 4th Battalions were consolidated under the command of LTC John A. Knutzen on August 8. The reorganized 1st Battalion now consists of a headquarters company and three student companies. In addition to providing command and control, administration, and logistical support for assigned and attached personnel, the 1st Battalion also provides Advanced Individual Training and skill level instruction in MOS 35E, 52C, 52D, and Maintenance Management. The Engineer Training Brigade at Fort Belvoir is now composed of the 1st and 3rd Battalions, a Noncommissioned Officer Engineer School Detachment, and an Allied Student Support Detachment.

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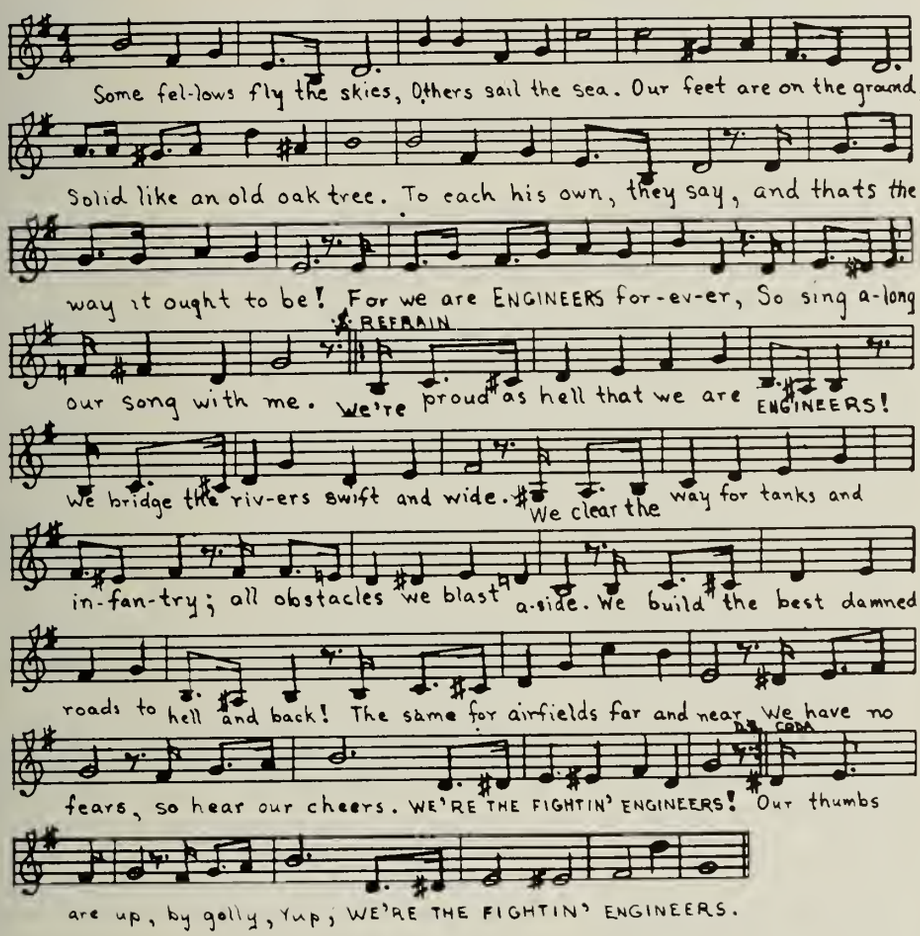
' THUMBS UP '

J.R.L.D. 'We're the Fightin' Engineers' JAMES R.L.DUFF



James R. Duff, a retired Army engineer officer currently employed at Fort Belvoir, VA, wrote "Thumbs Up! We're the Fightin' Engineers" more than six years ago. Ever since then he has been campaigning to have it adopted as the official marching song of the Corps of Engineers, without success. But Duff's campaign to gain official acceptance appears to be gaining momentum. The march was used for the first time during an official military ceremony in August at Fort Belvoir. Duff will provide copies of the tune to anyone who sends him a stamped, self-addressed envelope. His mailing address is: Training Literature Division, Directorate of Training Developments, Building 201, Fort Belvoir, VA 22060.

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FORUM

Should Ethics Be Taught in Army Service Schools?

Chaplain (MAJ) Stanley J. O'Loughlin

EDITOR'S NOTE: FORUM is a new section or "department" designed to provide additional space for the expression of professional views by Army engineers worldwide. It is hoped that engineer officers, enlisted personnel, and DA civilians employed in Army engineer related jobs will take advantage of the opportunity to express their views on doctrine, organization, tactics, equipment, management, training, leadership, or any other subject with potential interest for soldiers in general, or engineers in particular. What you have to say is the most important consideration, not how you say it or how much you say.

Should ethics be taught as part of the Course of Instruction in Army service schools? This is an issue of considerable discussion within most Army service schools today. Pressure comes from above to "do something." The struggle rages in terms of how many hours to teach and from what academic division or branch they they should be taught. The opinions of students are so diverse as to be inconclusive.

The issue of ethics is certainly a live one within the military profession, just as it is among most professions in our society. The cause may be fallout from the Watergate, My Lai, and corporation scandals, or it may be merely an issue whose time has come. Nevertheless, ethics is an extremely controversial issue throughout our society today.

In recent years, several significant surveys and studies have been done within the Army and each gives indication that disturbing factors exist. The most recent study, conducted at Fort Carson in 1978, seems to suggest considerable confusion about what constitutes a realistic military ethic and a tremendous variance between the perceptions of junior officers as opposed to the perceptions of senior officers.

So, the issue of ethics is with the Army and there is certainly enough evidence of serious, if not critical, concerns that must be considered more completely. The question is, who should tackle the problem, and how?

I suggest that the Army service school is the ideal agency to carry a significant amount of the responsibility. The reasons are obvious:

—Over a three to four year period, using the model of the US Army Engineer School, two whole generations of junior officers and one generation of senior noncommissioned officers attend The Engineer School for one class or another.

—The student is already in an academic atmosphere in which he/she is exposed to new and signicicant developments.

—Generally, time and expertise are more available within a service school environment then in field units.

Yet, a number of problems exist when ethics is taught as part of a service school Course of Instruction:

—How much time is available for teaching ethics? Service schools seem to have the unique ability to say things like, "Teach all that is significant about ___ and do it in one hour." A subject like ethics in the military requires at least four hours to minimally expose a student to the salient issues.

—A school atmosphere is extremely sensitive to pressure from "stovepiping." Ethics may be a "hot" issue now, but a "cold" issue tomorrow. Ethics needs to be taught on the merits of its own validity, and not because it is the newest novelty.

—The danger exists that what is taught as ethics will relate only to the trivial. Every school remembers the ethics classes that never got beyond the issues of taking government pens home and drinking coffee in the unit dining facility without paying for a meal.

—Perhaps the greatest issue is the subject matter. There is so much confusion on the issue of ethics. How can something of relevance be taught?

Having looked at these difficulties, the problem of whether, when, and how to teach ethics remains. At the US Army Engineer School we require each Advanced Class officer and noncommissioned officer to write a short paper on an ethical issue they have experienced. Their papers vividly demonstrate the number and seriousness of ethical dilemmas confronting Army leaders today, as well as the confusion surrounding an appropriate response. But most of all, we see the frustration and anger of the respondents who feel they have little guidance or understanding in these matters.

Clearly, the problems are real and urgent. The service school, despite these problems, still represents the best source of military education in ethics. Yet, we need to define the limits of our abilities to teach in an academic environment, and our goals in teaching.

My suggestion is that the service schools can eliminate, or at least, minimize the confusion. Too often, what one reads in military publications seems to indicate that our generation discovered ethics. In addition, there is no clarification of terms. Do such words as *values, morals,* and *ethics* mean the same thing? If an ethical act is a moral act, who determines the morality of it? Most misconceptions stem from the basic resistance toward the study of ethics.

Surely, one requirement of an ethics class is to show how the study of ethics is rooted in the framework of ethical philosophy. The student must be aware that he/she has no more or less ethical options open to him/her than the philosopher did 300, 500, or even 2,500 years ago. It is from the same options that current military leaders must make their decisions.

A second requirement for an ethics class is to sensitize students to the major ethical issues in the Army today. Our findings at The Engineer School indicate that most students are not even aware that lying publicly to support a commander is an ethical consideration. We cannot tell students that there is only one correct decision for each situation, but we can help them be aware of the possible consequences of their decisions.

A third requirement for teaching ethics is to educate students on resources available to help them make ethical decisions. Bibliographies, handouts, and references are just some of the possible sources.

Finally, students can be taught basic skills in arriving at an appropriate ethical decision. These include the means of isolating a problem, weighing the effects of a given decision, and separating rationalization from fact.

In summary, it can be said that the US Army, reflecting society as a whole, is experiencing a great deal of ethical confusion and concern. The young military leader indicates in many ways a need for assistance in facing ethical dilemmas. Despite numerous problems, Army service schools seem to be the ideal proponent for instruction in ethics.

Ethics instruction should:

—clarify existing confusion

—sensitize students to the major ethical considerations at each grade level

—provide guidance for finding reference material

—provide the basic skills and techniques for making ethical decisions.

Should ethics be taught in US Army service schools? Given adequate time and instructors with genuine expertise, the answer is YES!

Chaplain Stanley J. O'Loughlin is presently assigned to the 1st Brigade, 2nd Infantry Division, Camp Casey, Korea. When he wrote this article, he was assigned as Chief, Command and Organizational Effectiveness Branch, US Army Engineer School, Fort Belvoir, VA.

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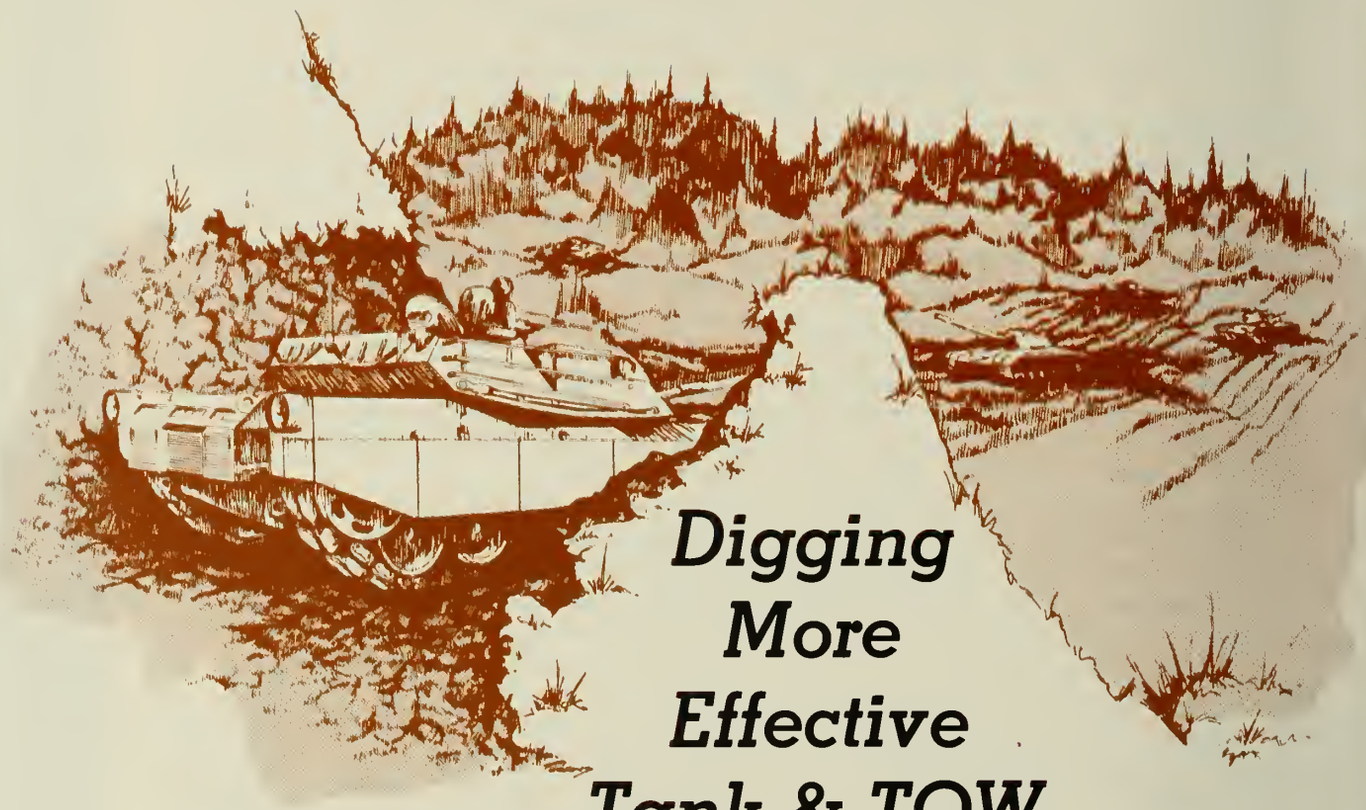

Digging More Effective Tank & TOW Defensive Positions

by CPT Eric T. Mogren

The concept of positioning antitank weapons to take advantage of flank shots and provide greater protection for antitank weapon crews is described and supported

Some time ago, the brigade commander (whose unit my Engineer Company supported), his plans officer, and myself were making a reconnaissance of a stream valley in Germany. The objective was to select potential battle positions and obstacle locations to support a defense along that valley. In the course of our discussions, the commander came up with an idea that would greatly increase the killing effectiveness of his tanks and TOWs and would provide much greater protection from enemy observation and fire than the standard hull defilade position.

His concept was similar to that of the two-man fighting position; instead of facing to the front, antitank weapons would alternate facing left and right. Instead of shooting across the valley, each weapon would shoot up the length of the valley, (Figure 1). By integrating well-sited minefields and antitank ditches, the crews would be able to engage targets with deadly flanking shots, often at maximum range.

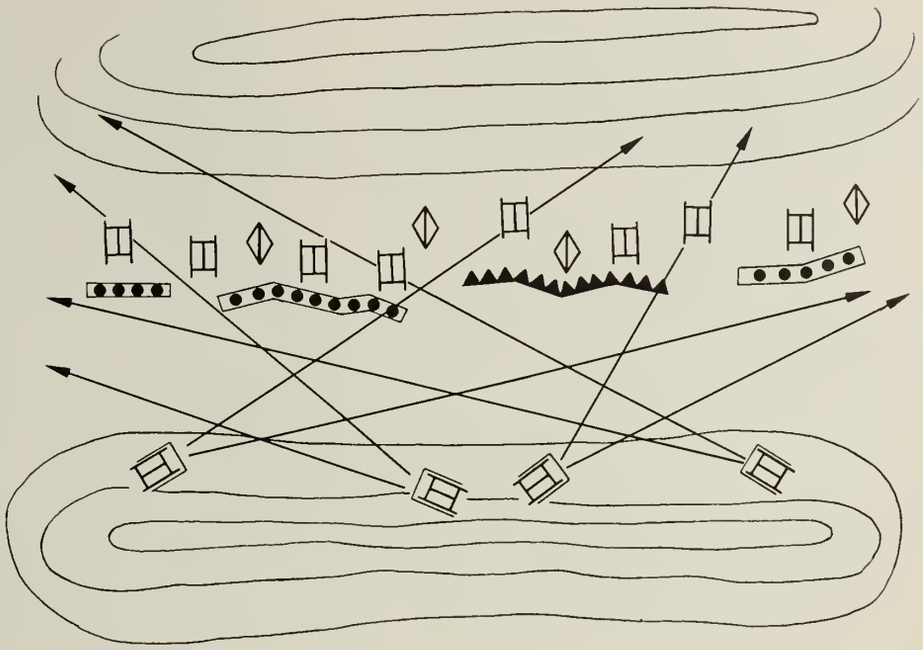

FIGURE 1

The idea of positioning antitank weapons to take advantage of flank shots is certainly not new. In fact, FM 71-1 (The Tank and Mechanized Company Team) discusses the concept in detail. What is not discussed adequately is the method of digging vehicular defensive positions to accomplish this. The standard tank and APC fighting position is a hull defilade trench scooped out of the ground by a bulldozer, dozer tank, or similar piece of equipment. Oriented to fire to the front (i.e. directly at oncoming forces), these positions are susceptable to enemy observation and fire from both assaulting and supporting weapons systems (Figure 2). The result is that a tank or TOW can fire only a limited number of rounds before having to move to an alternate position.

By facing weapons to the left or right, it is possible to dig the fighting positions far deeper. Since the weapon is not firing to the front, the position is dug to put tanks in *turret* defilade, thereby providing maximum protection from the direct fire of assaulting forces. Similarly, antitank guided missiles (ATGM) can be dug in, placing both weapon and operator below ground level (Figure 3). By camouflaging the position and its entry/exit routes, crews are both covered and concealed from frontal observation. This allows them to fire numerous rounds before having to move to an alternate position, if indeed they have to move at all. The only real threat is from a direct artillery hit.

Criticism of this concept centers around three points: a weapons system so entrenched cannot engage frontal targets at maximum range; crews cannot observe enemy activity to their immediate front, and therefore are vulnerable to direct frontal assault; and this position, being deeper, will take longer to construct, thereby aggravating what is already a critical shortage of engineer construction equipment.

First, many positions (especially in Germany) cannot engage targets

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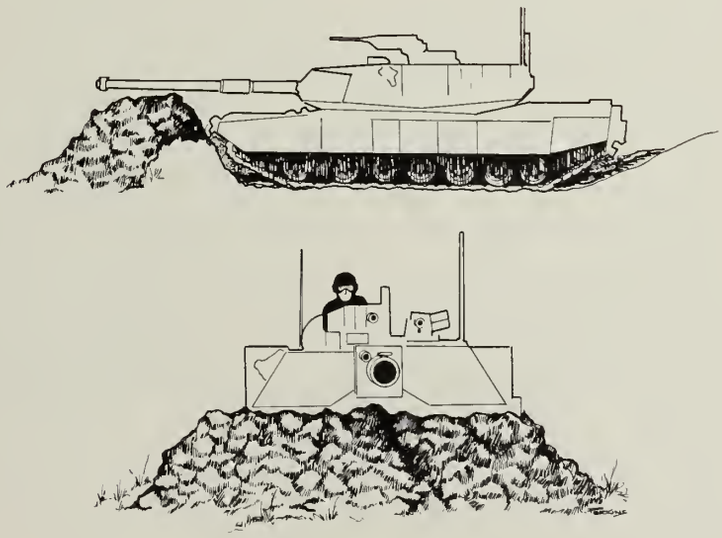


FIGURE 2

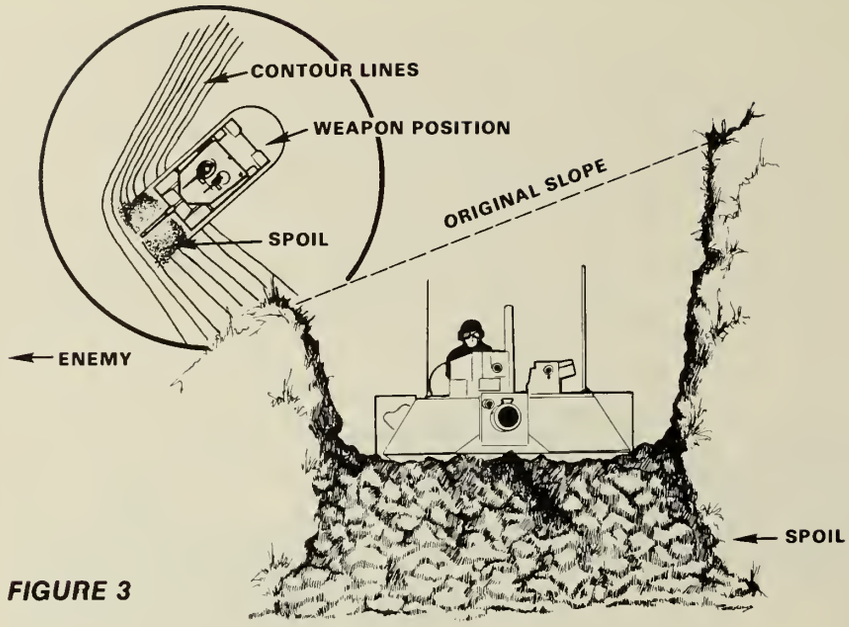


FIGURE 3

at maximum range anyway. Weather conditions, hills, forests, built up areas, and (in the case of ATGM) power lines inhibit taking full advantage of a weapon's range capabilities. In such cases, preparing positions as described would be very effective. Obviously, if engagement at maximum range is possible, this will govern the siting of weapons and the type of defensive position employed.

Immediate security to the crew is provided in several ways. Careful interlocking of fires from adjacent positions, the use of hasty protective minefields, and integrating dismounted infantry machine gun and DRAGON positions would overcome the lack of frontal observation (Figure 4).

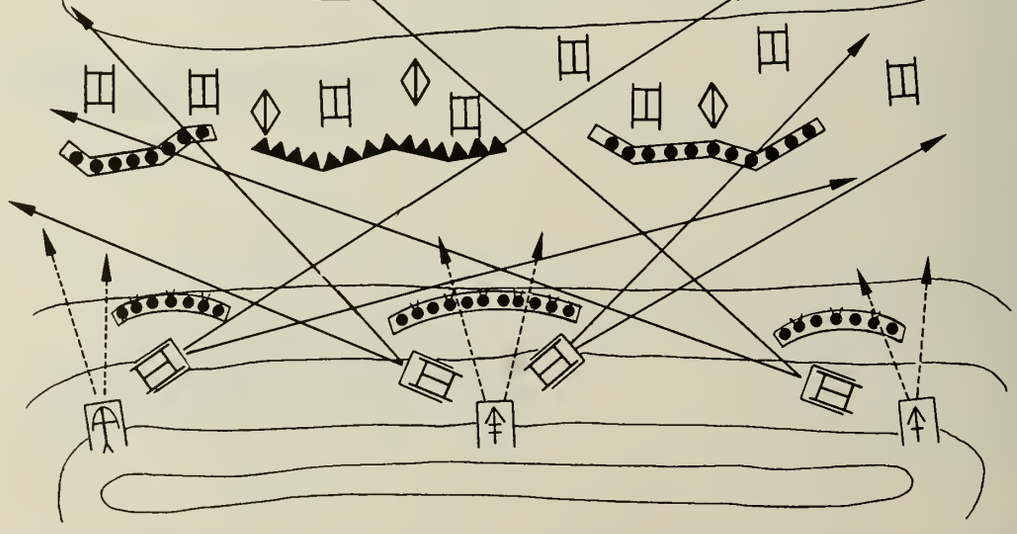
It is an unfortunate fact of life that much of our defensive capability is based not on what would do the best job, but on the limited resources available with which to do the job. This is particularly true with engineer operations. The shortage of engineer digging capability will be somewhat alleviated by the fielding of the new M-9 Tractor. It takes a bulldozer 20-30 minutes to dig out a standard hull down position for a tank, a rate that will increase with adverse soil or weather conditions.

I estimate it would take an additional 15-20 minutes to provide a turret defilade position as described above. This additional time is more than offset, however, by the increased killing effectiveness of the weapon and greater protection provided for the crew. In some cases, overall engineer work may be reduced by the need for fewer alternate positions.

Due to increased construction time and weapons orientation, this concept has limited application within the context of the active defense. But it is made to order for strong points, defense of key terrain, and defenses along river or stream valleys. Critical to winning the first battle will be our ability to inflict maximum destruction on the enemy while providing maximum protection to our own soldiers. Careful siting of tank killers, the integration of obstacles, and the preparation of deep, well camouflaged fighting positions is one way the manuever commander can achieve this.

Captain Rick Mogren is presently assigned as a lesson author in the Sergeants Major Academy, Fort Bliss, TX. He previously served four and a half years with the 12th Engineer Battalion, 8th Infantry Division.

FIGURE 4



PROJECT KRYPTONITE

by CPT Norman G. Comstock

Project Kryptonite has been called the largest explosive demolition project conducted by US Army Combat Engineers in Western Europe since World War II. The expenditure of 5,000 pounds of C4, 2,100 pounds of TNT, 3½ miles of detonating cord, 3,740 feet of time fuse, 720 non-electric caps, fifteen 15-pound and fifty 40-pound shape charges, two bangalore torpedoes for good measure, and over 45 project days lends credence to that assertion. For those involved, it was nothing less than the chance of a lifetime in peacetime for "a real blast."

The mission for Company D, 78th Engineer Battalion (C), 7th Engineer Brigade, was to demolish and remove an iron ore storage and processing facility called Barbara Mines. The facility was located in southwestern Germany, about 75 kilometers south of Karlsruhe. It was a German-American project for the city of Herbolzheim.

Six concrete and brick buildings required explosive demolition to one meter below ground level. Two other buildings demolished very easily with bulldozers. The six buildings requiring demolitions varied [illegible] size from a basement to two six story build[illegible] One structure, an airshaft and tunnel, was a[illegible] stories in size, but completely undergr[illegible]nts of the area said the buildings were [illegible]ted in the 1930s. The design

continued

Building number 4: note how close to the railroad the building is located. If it had fallen in the wrong direction, it would have meant disaster

criteria of the buildings far exceeded strength and durability requirements of the period. That became painfully clear early on. Thereafter, our first question was "When was it built?"

Project Kryptonite was accomplished in two phases. Phase I, work aboveground, took place in late October through November 1979. Phase II occurred from Feb. 10–25, 1980 with the below ground demolition and destruction of the tunnel and air shaft.

Buildings were assigned to line platoons and Direct Support (DS) elements for destruction. Decentralized execution was the order of the day. D/78 is a Corps Combat Engineer company augmented with dozers, cranes (one with clamshell), and 250 cfm air compressors from sister line companies. Since the project site was so close to the railroad linking northern and southern Europe, special constraints were imposed during the first 10 days. The most significant early constraint was that blasting was permitted only on weekends after midnight when train traffic was lightest. Later, blasting was permitted every day of the week.

The lessons learned from Project Kryptonite fall into four categories: General, Safety, Maintenance and Technical

GENERAL

• Our soldiers can do anything and endure anything as long as what they do has purpose, meaning, and challenge. Company personnel spent many lonely hours guarding the explosives and performing KP, CQ, and runner duties. They never complained because the project was a great source of satisfaction and pride.

• The Germans were unprepared for our work ethic. They were amazed at our tenacity and fortitude as we worked long hours and holidays in all kinds of weather.

• Be on the lookout for abandoned mines. The one used for our ASP provided a great storage facility. It would have been a good CP, too.

SAFETY

• During the haul operation, driver control was a real problem. Our drivers wanted to speed going up the hills of the haul route. To prevent speeding on a two-lane road with a blind curve, stern control was required.

• The local populace was extremely curious. Crowds could be controlled, but individuals came out of nowhere at the most critical times. They always cooperated, however, when asked to leave.

• Safe handling of unprimed explosives, as emphasized in training, is exaggerated, except for nonelectric caps. After about two weeks, D Company personnel realized that unprimed C4 or TNT is safe to handle. But much time was lost due to initial reticence. Safe handling of nonelectric caps and primed charges in not at all exaggerated and requires constant supervision. We had to prime shape charges nonelectically, requiring extra care, especially when working on a 75-80 percent slope 20 feet above ground.

• When drilling concrete with a 250 cfm air compressor, ear, eye, and lung protection are required. Dust created by drilling caused breathing and vision problems. Breathing protection devices need to be added to the components of the 250 cfm compressor. Drilling noise was deafening. Fatigue from constant drilling also was a problem.

• Know the number of explosions that are scheduled and keep count of them as they occur. Varying the length of time-fuse facilitated counting detonations. This is an old lesson worth emphasizing.

• On lengthy demolition jobs, a full-time safety officer or NCO is required. Laxity, overconfidence, and fatigue were constant problems. Continual vigilance is required.

• Have subordinate leaders wear distinctive apparel, such as helmets. When positive control is required, it was necessary to get to subordinate leaders quickly.

MAINTENANCE

• Preventive maintenance must increase as time on-site increases. During the last two weeks of November, one-third of the company's dump trucks (4) went "down" for preventive maintenance (PM) every third day.

• Since the concrete was heavily reinforced with steel, rebar created a big problem with truck tires. A special tire-changing, tube-repairing squad had to be employed.

• A DSU contact team was very helpful in repairing brakes and hydraulic lines. Given the haul distance and uphill drive, a team with brakes, transmissions, and transfers is a good idea.

TECHNICAL

• A detailed SOP for Project Kryptonite was necessary. It governed the job as both a project and a range. Requirements for transport, storage, security, and safety of the explosives were identified and incorporated into the SOP. Every officer and NCO was issued a copy.

• For the one-mile haul (two miles round trip) five 5-ton dump trucks were optimum. More than five trucks caused underutilization as they waited for loads; less than five meant underutilization of the lifting and loading equipment. Generally, the scoop loader loaded three trucks to the clamshell's two.

• At the height of the project, three large rubble piles were worked at a time. Dozers built the piles, segregating very large pieces into piles for the clamshell to load and smaller pieces and gravel for the scoop loaders. This insured that all equipment was working and equipment idle time was kept minimal. Almost 6,700 five-ton dump truck loads of rubble were hauled during the project.

• Do not forget the shock wave created by explosives, particularly when using external charges.

More than 400 pounds of externally placed C4 were detonated on a very clear night and blew out several windows 750 meters away. When the charges were placed and until 30 minutes before the blast, the weather was overcast with a low level of fog. At detonation, the weather was "clear as a bell."

• For any charge, tamped, or untamped, the minimum safe distance is 300 meters. Straw and hay bales worked very well to minimize the missile effect of each blast.

• Dual priming was wasteful on this project. Dual initiation, however, is an absolute requirement in order to minimize misfires and eliminate delays if the first fuse lighter does not light the time fuse.

• If a building is to be dropped on one side, overload the first story support on the side you want it to fall on. Prime half of the next support and charge the rear support only to insure it cracks or breaks. The idea is to use the building's weight against itself so it will break upon hitting the ground. When we cut one building on the same plane, all we did was reduce the height of the building by one story.

• Shape charges generally bored textbook size holes. However, when shooting straight down or at an angle, the holes were filled in by loose rock after the blast. When the shape charge was inverted and fired upward at a slight angle, the result was a textbook size hole, but with some unexpected cracking of the concrete. Even though tamping was a little more difficult, this technique saved two to four hours in priming.

• With exactly the same poundage and placement, we got four different results when we detonated the charges in the buttresses of the Bunkerkeller. We drilled several 1.5 inch diameter holes three feet deep in each buttress. Holes were spaced five feet apart, starting 2.5 feet from the wall and 2.5 feet from the ground. One block of C4 (1.25 pounds) was put in each hole, primed with det cord, and left untamped. The results varied considerably. One buttress was nearly demolished. The results were attributed to two factors—hand tamping was probably different for each buttress; and placement of Ule knot varied from the end to the middle of the charge. The explosives seemed more effective when the knot was placed on the external end of the charge.

• TNT was inadequate for cutting through steel unless the charge was tamped. An external, untamped charge on a concrete wall reinforced with steel mesh merely blew the concrete away from around the steel mesh. However, TNT was effective when the charge was external and backfilled with about three feet of dirt. Half-inch rebar in an eight-inch thick wall was cut along with the concrete when this technique was used.

• Test shots are required. They reveal how much and what type of reinforcing material is in the concrete.

The Bunkerkeller: note the different results from the same amount of explosives placed in the same location

• Internal charges are nearly always successful. External, relatively untamped charges yield a myriad of results.

• Have an operational cutting torch available to cut the rebar. Once the buildings were rubbled, it was not practical or efficient to keep blasting on them to cut them into small pieces for loading. So, a cutting torch instead of explosives was used.

• There was compatibility of German time fuse, det cord, and nonelectric caps with US fuse lighters, det cord, time fuse and caps. The powder train in the German det cord was more easily broken compared to the US det cord. Static electricity resistant caps were used very effectively on this project as well. For contingency planning purposes, it would be very helpful to know where German civilian stocks of explosives are located, along with other engineer resources.

Project Kryptonite clearly pointed up the need for more realistic training of Combat Engineers. The lessons we learned are far more meaningful and extensive than those learned on a normal demolition range. Keeping in mind the timidity of soldiers in handling explosives, the holes that filled in when shooting shape charges straight down, dual priming that is time consuming and wasteful, and the unexpected heavy reinforcement, some rethinking and redesigning of target folders needs to be accomplished. Perhaps a review of doctrinal publications is also in order.

Project Kryptonite was a truly outstanding experience. Those who took part in it probably would endure the foul weather, guard duty, KP, and all the other burdensome distractions to be able to accomplish such a mission again.

Captain Norman G. Comstock was the Officer-in-Charge of Project Kryptonite while serving as commander of Company D, 78th Engineer Battalion. He has held several command, staff, and advisor positions.

THE DIVISION ENGINEER IN THE GERMAN ARMY

by LTC Juergen M. Erbe

Hardly any task in the Army is more difficult or more controversial than that of the division engineer. The same difficulty applies to the brigade engineer. It is possible to be trained and selected as a commander, but the additional responsibility of advising the division commander and his staff proves to be much more difficult.

It cannot be the purpose of this article to solve future problems. If it were that easy, there would not be any more problems. I cannot and do not want to give the impression of being a schoolmaster. It is my interest to stimulate thought and discussion in order to come to a solution, or at least a reduction of the difficulties. A final solution is possible only when our armies are able to appoint an engineer colonel (0-6) with experience (i.e. commander of a division engineer battalion, G3/S3 of a brigade or division) as division engineer in main utilization. That is how it is done in the British Army. At this time, however, I do not see any possibility of realization for the US and German Armies.

The commander of the engineer battalion is the division engineer. He works directly for, and is the adviser to, the division commander, his staff, and other commanders (Artillery). In emergencies, he can be represented by the S3, but not by the engineer staff officer of the division, who lacks insight into the engineer battalion and, as a rule, lacks the required experience.

In the support section is an engineer cell, where engineer information is gathered and summarized, proposals and orders are prepared, obstacle plans are handled, engineer reports are worked on, connections are kept, etc. The head of the engineer cell is the division engineer. He works for the chief of staff and is, in case of absence, represented by the division engineer staff officer (0-4 or 0-5).

These dual responsibilities as adviser to the division commander and as head of the engineer cell in the support section must be separated in order to fully understand the tasks of the division engineer. Therefore, the position seems to be more complex at first. It is my impression, however, that it will become easier if the division engineer concentrates on his role as adviser, and provides only guidance for other activities in the engineer cell and watches over the execution.

The division engineer is not tied to one place. Where he locates depends on the needs of the division commander and his own decision. Surely the personalities of the division commander and the chief of staff, and the working manner of the staff are significant. Contact and communication with the G3, G2, and the division artillerist can be helpful. There is no procedure for the position of the division engineer, which makes the task so difficult. It requires a certain sense of touch and sensibility, and sometimes luck. But surely there are events which require him to be at a certain place.

Normally he will be needed at the *division* main command post:

- for a situation estimate;
- while awaiting a corps operation order;
- during change of the type of operation (delay, defense, offense);
- during change of a main effort;
- in case of a substantial change in the task organization;
- during change of the operational control for the division.

He would be at his *battalion* command post:

- for preparation and distribution of engineer operation orders;
- for a joint scouting of the commanders;
- during a main engineer effort like a river crossing operation in a critical situation;
- during each first employment of his battalion.

This way he can often recognize difficulties in the execution of the order in the beginning, handle crises, and provide leadership. Here again, it depends on sensitivity, knowledge of his unit, and luck in being at the right place at the right time. The division engineer must never be enroute between the division command post and his battalion when he is needed at one or the other place. Even during his absence from the command post, he must always be available for the division commander. He also must always be oriented to the situation in his engineer units in order to become engaged in time. Which means that he must have good lines of communication at his disposal.

Again and again there are discussions about control of the obstacle plan. *Who* shall accomplish it? *Where* shall it be accomplished? *Who* has to approve it? The only certainty, however, is that it has not functioned satisfactorily in the past. It has not been up-to-date or accurate. Often, approval for obstacles is received too late or execution is begun without permission. It is advisable to

keep a general obstacle map at the division command post, which includes blocked areas, obstacle-free areas, obstacle gaps, and gap routes. It is preferable to keep the obstacle plan, with all details, at the division engineer battalion.

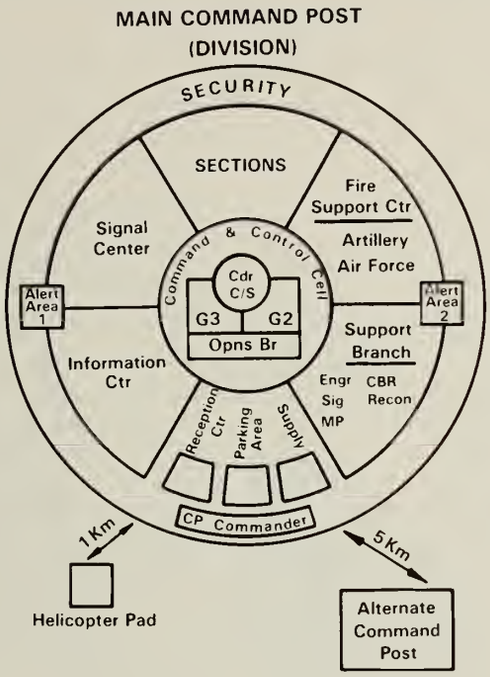
At present, the German Army is studying the concept of retaining obstacle control at brigade level because of the independent and fast operations of brigades. Experiments have been successful and a change is quite likely. One problem yet to be resolved is the personnel (staff) outfit of the brigade engineer.

While planning the first action, and when development of the situation outdates the elaborated operation plan, the division engineer must be available. He must get involved as soon as possible and should not wait to be called. It will be clever and valuable to be in contact with the G3, G2, G4, and division artillery commander in order to work as a team. The division mission should be analyzed as soon as possible for impact on engineer missions. To think and act jointly in accordance with the division order is of great importance. All possibilities must be considered, and manpower and means must be coordinated. If the division engineer simply recites the engineer action in support of division operations, he will only get arguments when questioned. All too often, he must explain, prove and apologize for his proposals.

The engineer contribution to the division operation plan must be formulated and recited and/or presented in writing to the G3. If time permits, the division engineer should communicate considerations, thus eliminating confusion in his battalion, in the brigades, with the G4, and the Artillery.

With thorough communcation, the classic demands of staff duties—cooperation, analysis, coordination, and information—are fulfilled. These demands must be met not only during the planning phase of an operation, but also for the purpose of command and control in battle and in peace time.

The mission of engineers is to give support. They shall ease the battle, complete fire, and influence mobilities. Mobility and countermobility are the decisive engineer contributions on the battlefield because mobilities determine success or failure. Therefore, the division engineer must ask himself: How can I be of help to my troops, and how can I hurt the enemy by impeding his movements? That's what counts in the framework of the division, not the number of tanks lost from mines. The disturbance of enemy mobilities results in additional time for reconnaissance, preparation of the battlefield for combat, and destruction of enemy forces.



The division engineer has to think jointly. He must not confine his thoughts to engineer matters, but should consider all factors influencing the battle.

The job of division engineer remains one of the most difficult in the Army. It is difficult because of his triple role as battalion commander of the division engineer battalion, as adviser to the division commander and his staff, and as a member of the division staff. Besides experience and knowledge of engineer techniques, he needs a sense of feeling for human beings and for situations in order to be at the right place at the right time and to provide the right advice or to take the right action. This surely can be learned only to a certain degree.

We engineers should start to educate and train our lieutenants to work two levels higher at maneuver battalion for the combined arms team. To be an engineer commander is a challenge. Let us stand up to it.

Lieutenant Colonel Juergen M. Erbe is currently assigned to the Office of Research, Development and Acquisition of Engineer Equipment, Minister of Defense, FRG.

The Terrain Analysis Center

by CPT David R. Gallay

TAC's products can provide timely, accurate advice to maneuver commanders and enable them to use terrain as an effective combat multiplier

"How fast can my vehicles cross this terrain?" . . . "Will the lines of communications be adequate?" . . . "Where are likely drop zones?" . . . "What areas will afford us adequate cover and concealment?" . . . These are some of the "terrain" questions that commanders and staff officers often ask when planning tactical operations. They will turn to their engineer for the answers.

But, where does the combat or topographic engineer turn for quick, accurate information?

One place is the Terrain Analysis Center (TAC) at the US Army Engineer Topographic Laboratories (ETL), Fort Belvoir, VA. TAC, established by the Chief of Engineers in 1975, is a small organization comprising 39 military and civilian terrain experts, cartographers, and information specialists. Its primary mission is to produce terrain analyses in support of tactical-level operations.

TAC supports requirements generated from the field. Field commanders and their planning staffs identify potential areas of interest. The initial demand and size of the area typically exceed the capacity of supporting field terrain detachments. Thus, requests for analysis support are submitted through command channels to the Department of the Army level. If the Assistant Chief of Staff, Intelligence, validates the requirements, TAC may be tasked through the Office of the Chief of Engineers to do the work.

Upon receipt of a tasking, source materials are identified and acquired for use in the analysis. The materials range from various kinds of maps and studies to aerial photographs, satellite imagery, and computer tapes of digital terrain models.

After the material is assembled, analysis teams go to work. The team approach is "interdisciplinary." The team leader integrates the interpretations and analyses of his team members—civilian engineers, geographers, geologists, foresters, soil scientists, military image interpreters, and terrain analysts. The team concentrates on the essential elements of terrain analysis (Figure 1). They first interpret and classify "basic" data. Then, they synthesize a number of basic elements to arrive at the "evaluative" data. For example, a cross-country movement prediction is a function of all the basic data.

The final product format, as well as the number of essential elements in each study, depends on what the requestor wants. However, TAC's typical output is graphic, either an overprinted map (Figure 2) or a factor overlay. Regardless of the type, each graphic item displays an essential element keyed to a base map. Some studies contain only

BASIC DATA	EVALUATIVE DATA	OTHER DATA
SURFACE CONFIGURATION	CROSS-COUNTRY MOVEMENT	WATER RESOURCES
SLOPE	COVER AND CONCEALMENT	ENGINEERING GEOLOGY
ENGINEERING SOILS	AVENUES OF APPROACH	BUILT-UP AREAS
VEGETATION	LINE OF SIGHT	PORTS AND HARBORS
SURFACE DRAINAGE	KEY TERRAIN	AIRFIELDS
CLIMATE	STATE OF GROUND	TRANSMISSION FACILITIES
LINES OF COMMUNICATION	DROP ZONES/LANDING ZONES	STORAGE FACILITIES

FIGURE 1

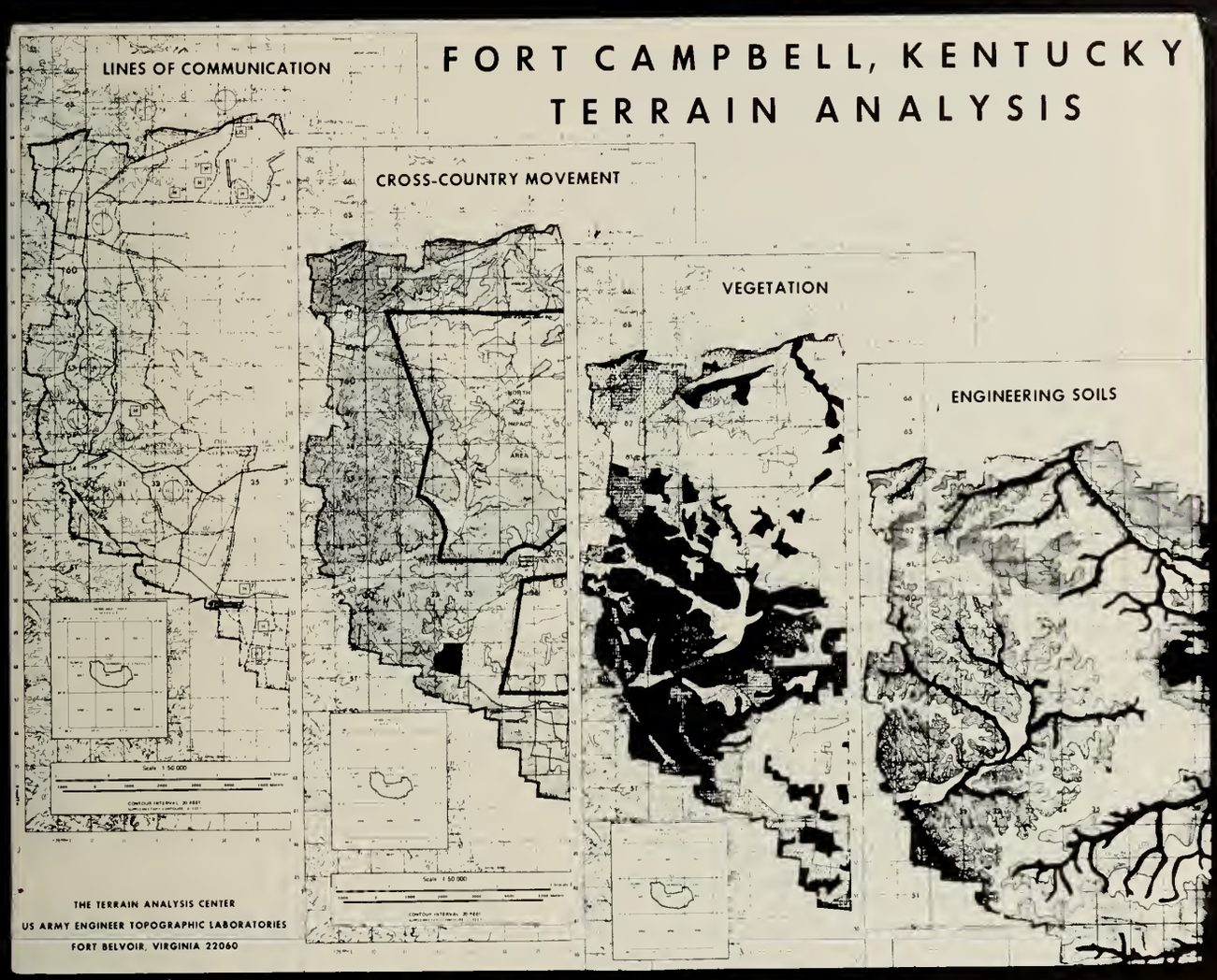


FIGURE 2

ten or twelve elements, while others may have many more.

TAC's products are not ends in themselves. They are designed as operational planning tools that often need to be supplemented by ground or aerial reconnaissance for site-specific operation. Yet, on the modern battlefield, where terrain is a decisive factor and planning time is limited, these products can be of great value. The engineer who uses these products will be able to provide timely, accurate advice to maneuver commanders and enable them to use terrain as an effective combat multiplier. This will help win the first, and subsequent battles.

Captain David R. Gallay is presently assigned as a Research and Development Coordinator in the Terrain Analysis Center, US Army Engineer Topographic Laboratories, Fort Belvoir, VA. He has commanded engineer companies in Korea and USAREUR.

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The 20th Engineer Brigade (Combat) (Airborne Corps) is located at Fort Bragg, NC. It exercises command and control over all non-divisional engineer units assigned to XVIII Airbone Corps. During peacetime, the brigade is assigned one airborne combat engineer battalion, one combat heavy engineer battalion, and one composite battalion. When deployed as part of the newly formed Rapid Deployment Force, the brigade's span of control extends to several additional battalions.

In most contingency operations, a brigade command and control element would precede most non-divisional engineers into the area of operations to coordinate the arrival and employment of those forces. In cases where the command and control element arrives in the area of operations prior to completion of airfield construction by the airborne engineer battalion, the brigade element is capable of parachuting into the airhead.

The lineage of the 20th Engineer Brigade dates back to the Civil War. It was designated as the Battalion of Engineers on August 3, 1861. Unit designations have changed many times since then as predecessors of the 20th served in the War With Spain, the Philippine Insurrection, the Mexican Expedition, and World Wars I and II.

On August 16, 1950, the brigade was first designated as the 20th Engineer Brigade and activated at Fort Leonard Wood, MO. It deployed to France in November 1952, and established headquarters at Croix Chapeau. The brigade redeployed to Fort Bragg in March 1956 and was inactivated on November 12, 1958.

Brigade headquarters was reactivated in May 1967 at Fort Bragg and departed for the Republic of Vietnam in August 1967. During the Vietnam conflict, the brigade numbered over 13,000 officers and enlisted men, organized into three engineer groups, with 14 battalions and 31 separate companies and detachments. The brigade

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provided all non-divisional engineer support in Military Regions III and IV during 11 campaigns. Units cleared more than one-half million acres of jungle, paved 500 kilometers of highway, and constructed bridges totalling more than six miles in length.

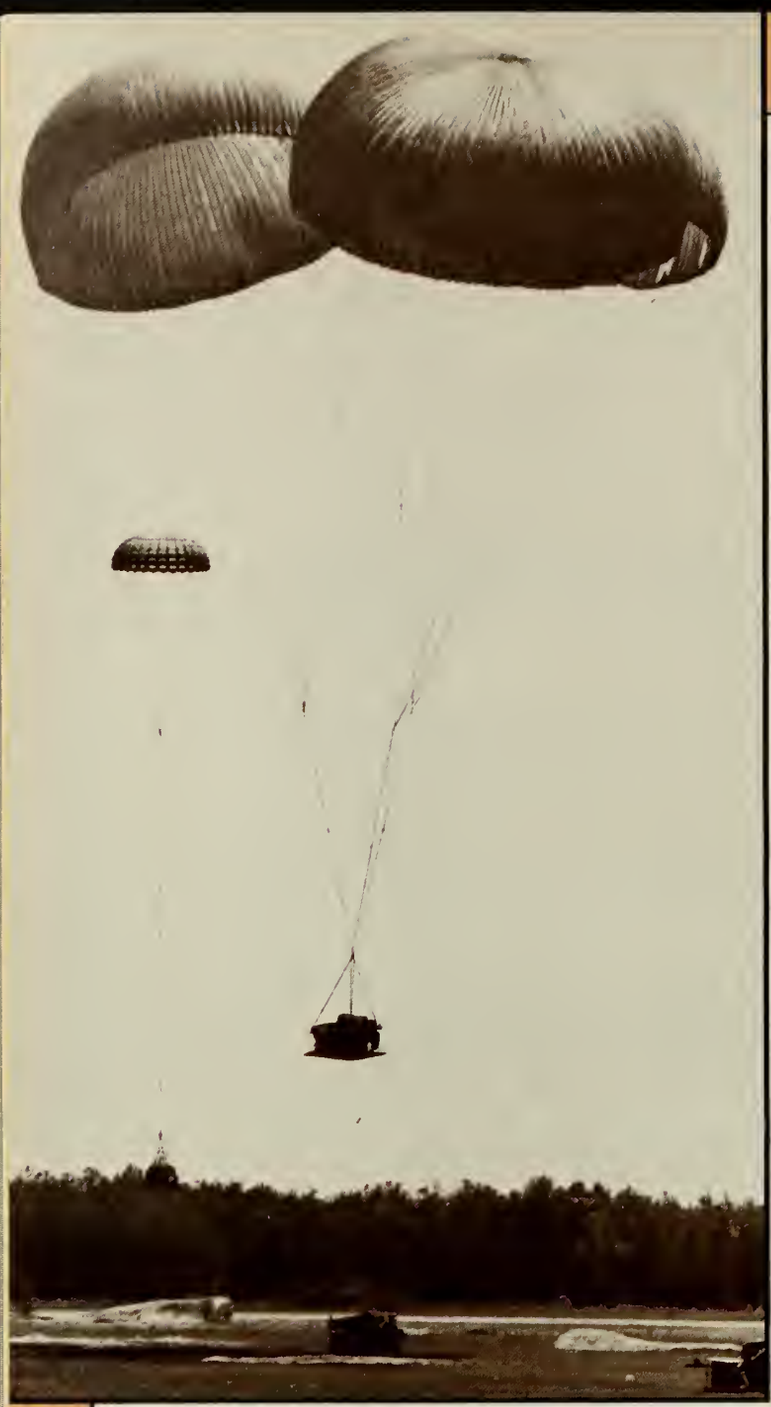
As US forces were withdrawing from Vietnam, the brigade was inactivated in September 1971. Reactivated in June 1974 at Fort Bragg, it is the only engineer brigade in CONUS, and the only airborne engineer brigade in the entire US Army.

The brigade's airborne engineer battalion, the 27th Engineer Battalion (Combat) (Airborne), is designed to provide direct engineer support to a committed airborne division as required, to construct airfields, to perform expedient repairs to existing airfields, and to complete general combat engineer missions. Battalion equipment can be introduced into an area of operations by either heavy drop or by Low-Altitude Parachute Extraction (LAPES). The battalion has the capability to provide the Corps with two medium-lift forward landing strips within 72 hours.

The 27th Engineer Battalion was activated in January 1918 and saw action in World War I in both the Saint Michiel and Meuse-Argonne campaigns. After cessation of hostilities, the battalion was inactivated.

In 1941, prior to US entry into World War II, the battalion was reactivated as the 37th Engineer Battalion at Camp Bowie, TX. In 1943, redesignated as the 209th Combat Engineer Battalion, it deployed to Bombay, India. It served throughout the war in the India-Burma Theater, building portions of the strategic Ledo Road in Burma as well as joining "Merrill's Marauders" for the surprise attack that captured the vital Myitkyina Airfield in Burma. The battalion was inactivated in November 1945 at Camp Kilmer, NJ, and reactivated in September 1950 at Fort Lewis, WA, as the 27th Engineer Battalion.

continued



In 1951 the 27th was relocated to Fort Campbell, KY, and remained there until 1966, when it deployed to the Republic of Vietnam. During the next six years, it participated in 12 campaigns. In January 1972, the battalion was deployed back to Fort Bragg and redesignated as an airborne combat engineer battalion.

The 584th Engineer Battalion (Combat) (Heavy) provides the 20th Brigade with a heavy construction capability. The unit is equipped with military and commercial construction equipment, such as the D-8 bulldozer, the five-cubic yard front loader, and the 20-ton dump truck. Deployment by sealift is normal, but it can also deploy by air, utilizing a combination of C-141 and C-5A aircraft.

The lineage of the 548th Engineer Battalion (Combat) (Heavy) began with activation of the 548th Engineer Light Pontoon Company in March 1943 at Camp Blanding, FL. After four campaigns in the European Theater, the unit was inactivated in November 1945, only to be reactivated a year later in Germany and redesignated as the 548th Service Battalion. The 548th saw extensive service during the Korean War, earning nine campaign streamers before inactivation in Korea in March 1953. It was reactivated for less than a year in Italy in 1957 and again in 1961-62 at Fort Richardson, AK, for 18 months. On March 1, 1968, the 548th Engineer Battalion was again activated at Fort Bragg.

The Composite Battalion consists of the Brigade Headquarters Company, the 264th Medium Girder Bridge Company, the 63rd Topographic Company, the 283rd Terrain Analysis Detachment, and the 285th Utilities Detachment.

The 264th Engineer Company (Medium Girder Bridge) provides the Corps with tactical fixed bridging. The unit can supply and construct four medium Girder Bridges, each 104 feet along. The unit also has a secondary mission as a dump truck company, with 30 five-ton dump trucks. The 264th has also retained the Bailey Bridge for training.

Above, equipment of the 27th Engineer Battalion (Combat) (ABN) is airdropped onto a DZ at Fort Bragg during ARTEP. Right, members of the 264th Engineer Company (MGB), Composite Battalion, emplace panels of the Medium Girder Bridge during recent training exercise

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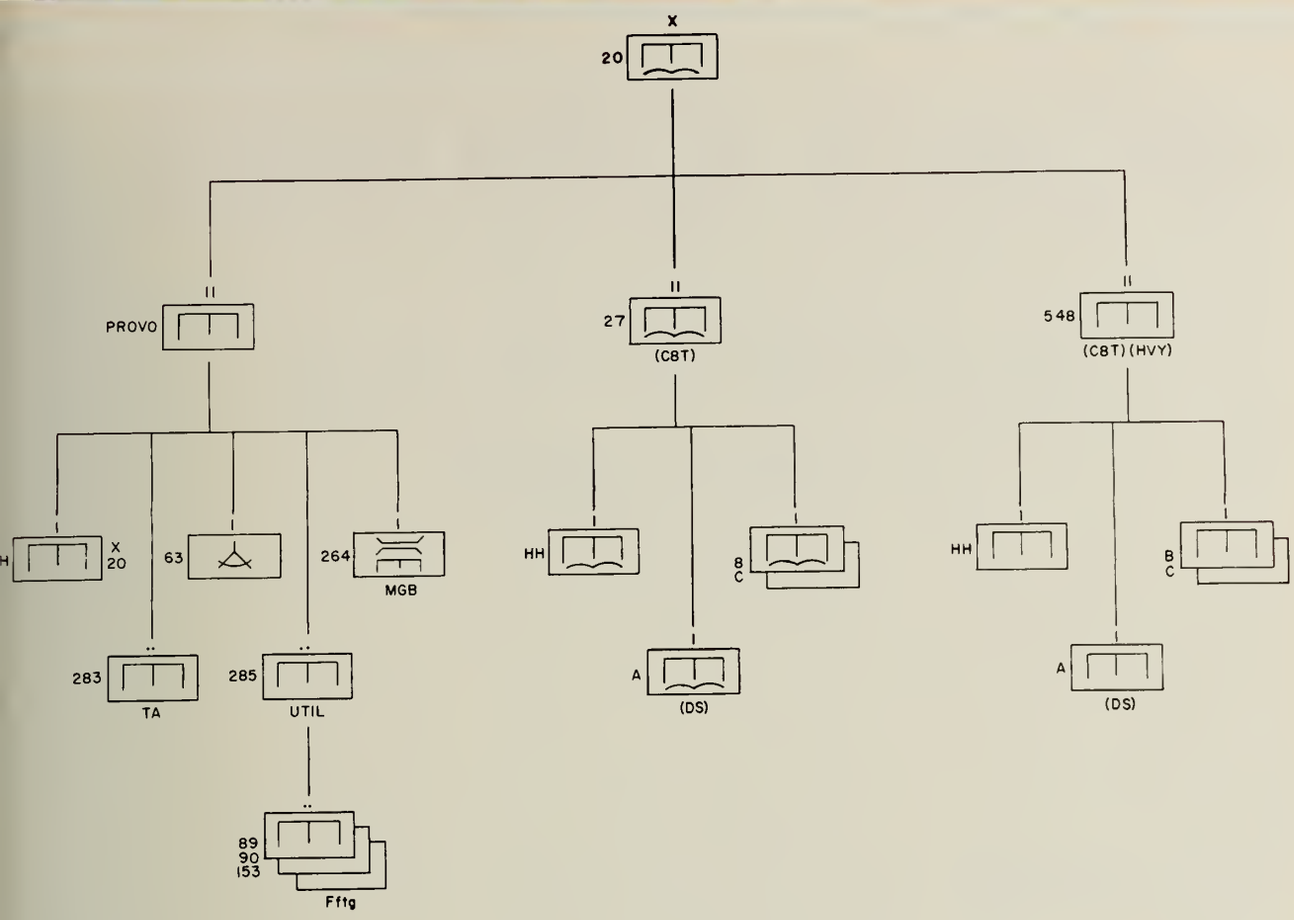

The 63rd Engineer Company (Topographic) (Corps) represents a significant resource for the dissemination of topographic information in graphic form to the tactical commander. The company contains survey, cartography, and reproduction platoons, and runs the Post Map Depot. The unit is best suited for constructing non-standard graphics, overprinting standard maps, and producing photomaps.

The 283rd Engineer Detachment (Terrain Analysis) also provides valuable topographic analysis to the tactical commander. The unit collects and evaluates military terrain data and provides terrain studies in both graphic and textual form to the Corps and other major headquarters.

The 285th Engineer Detachment (Utilities) has primary responsibility for establishing and maintaining facilities for the Corps headquarters in an area of operations. At Fort Bragg, the 285th also provides a valuable repair and construction resource for the post. The 89th, 90th, and 153rd Detachments (Fire Fighting) provide fire-fighting support to the military installation. Their wartime mission is to support forward landing strips in an area of operations.

Overall, the 20th Engineer Brigade has the capability to provide XVIII Airborne Corps with a wide spectrum of engineer support. With both light and heavy units, the brigade has the flexibility to meet the variety of contingencies facing the Rapid Deployment Force. It can provide conventional combat engineer support, as well as topographic, terrain analysis, and utilities support.

The 20th Engineer Brigade is proud of its long service to both the nation and the Army. Having participated in 30 campaigns—more than any other major unit in XVIII Airborne Corps—the brigade is confident of a future of continued service to XVIII Airborne Corps, the Army, and our country.

APOLOGY

We apologize to current and former members of the 7th Engineer Brigade for publishing the wrong unit crest with an article on the 7th Brigade in the Summer 1980 issue of ENGINEER. We inadvertantly selected the 7th Engineer *Battalion* to illustrate the article.

ROAD CRATERS

Technical and Tactical Considerations

by CPT Robert D. Volz

The coordinated use of obstacles to delay or cannalize opposing forces is an essential task for engineers of the combined arms team. The engineer must be proficient not only in coordinating the siting of obstacles with the manuever commander, but he must also construct the obstacles so that they optimize the use of manpower and material.

Studies of obstacle plans have shown that road craters are perhaps the most frequently preplanned demolition target. However, few engineers have an appreciation for the environmental factors which influence crater effectiveness and construction time. The objectives of this article are to familiarize the reader with some of these factors and to compare some alternatives for construction of road craters.

Road craters are point obstacles created by explosive excavation of a roadway. While it is possible to use earthmoving equipment for this excavation, it is generally not considered practical since some pavements are difficult to break and also since such operations divert equipment from the important task of digging

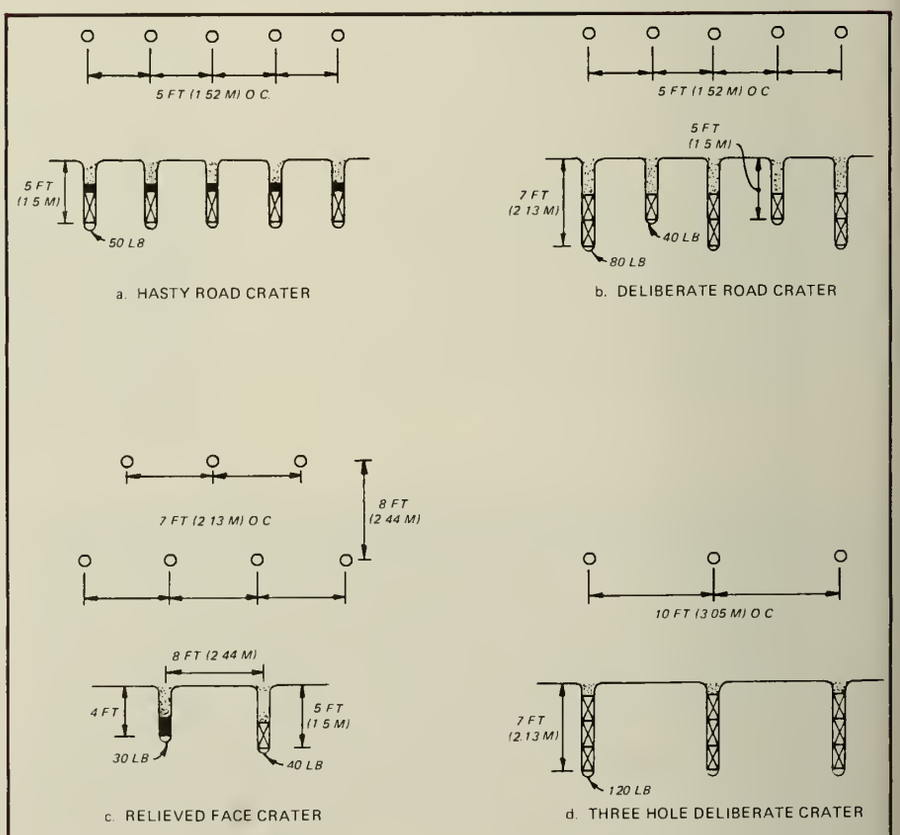

Figure 1. Road Crater Designs

hull defilade positions and tank ditches. Prechambered craters which require a preconstructed emplacement cavity, and employment of Atomic Demolition Munitions (ADM) are special cratering applications limited by political as well as strategic considerations.

Current doctrine recognizes three road crater designs: the hasty, deliberate, and relieved face craters, listed in increasing order of effectivness. The charge configurations of these designs are illustrated in Figure 1A, 1B, and 1C, and are discussed in FM 5-25 and FM 5-35. The expected size and relative effectiveness of each design is included in Chapter 3 of FM 5-25 and the estimated emplacement times can be obtained from ARTEP 5-145 and FM 90-7. These characteristics are summarized in Table 1.

While these designs and information have been utilized extensively for planning purposes, just how reliable are they? What factors should the engineer leader consider before selecting a particular crater design or system? A look at the results of cratering experiments and a comparison of existing and proposed cratering systems may well answer some of these questions.

The crater data published in FM 5-25 was derived from a single test program conducted at Camp A.P. Hill during 1963. Many craters were detonated as part of the test, but most of them did not utilize the standard crater designs or explosives currently in the inventory. During the entire test program, only five hasty, four deliberate, and two relieved face craters were executed with standard Army crater designs. The results have molded Army cratering doctrine for the past 17 years. Subsequent cratering tests have shown that cratering doctrine published in our field manuals is both inaccurate and incomplete.

Two important factors are ignored in present publications: the effects of soil conditions on crater size and effectiveness, and the dependence of preparation time on shaped charge performance in different road materials.

Terminology is important in comparing the results of cratering tests. Consider the crater profile of Figure 2. When a buried explosive charge is detonated, it creates a crater and forms an upturned lip around the crater rim. The apparent width and depth are the dimensions measured in relation to the original undisturbed ground surface. Crater site elevations must be measured both before and after detonation with a level or transit to determine the apparent dimensions. The obstacle dimensions are measured in relation to the crater lips and can be obtained by simple tape measurements. While obstacle dimensions are easily and quickly measured, the apparent dimensions provide a more accurate picture of cratering effectiveness. Comparisons of cratering data must utilize consistent dimensions.

One is led to believe that if he follows the instructions of FM 5-25 he will detonate a crater which is similar in size and effectiveness to the "hypothetical crater" shown in Table 1. Unfortunately this is not always true. Table 2 presents a comparison of deliberate road crater dimensions from FM 5-25 with the test results of craters detonated near Fort Peck, MT, and Aberdeen Proving Ground, MD. The effects of soil and moisture conditions are immediately apparent. The Fort Peck crater is approximately one-half as deep and three fourths as wide as the Aberdeen crater. Comparison of both sets of dimensions with those predicted by FM 5-25 demonstrates the wide variation in crater size which can result in different environments.

These variations in dimensions dramatically affect a crater's value as an obstacle. A deliberate road crater detonated in a wet clay soil may completely immobilize a tank while the same quantity of explosives used in the dry sand or clay of an arid region will not significantly delay a tracked vehicle. It appears that none of our standard cratering procedures will produce an effective crater in all soils.

While it may be possible to relate crater dimensions to moisture content and the unified soils classification system, such a system would be impractical for field use. Perhaps a suitable compromise is to group cratering

continued

TABLE 1

Standard U. S. Road Crater Characteristics
(FM 5-25, Feb 71)

	Average Crater Dimensions					Passes Per Tank Traverse	Installation Time (Squad Hours)*
	Depth		Width		Side Slope		
Type	ft	m	ft	m	Degrees		
Hasty	6-7	1.83-2.13	20-25	6.10-7.62	25-35	4	2
Deliberate	7	2.13	25	7.62	30-37	8	2
Relieved Face	7	2.13	25-30	7.62-9.14	30-40	—	2

* Installation time from draft FM 90-7, Dec 77; ARTEP 5-145, Jun 78 lists 1 hour, 15 minutes, plus time required to clear emplacement holes. Time does not include travel to or from site.

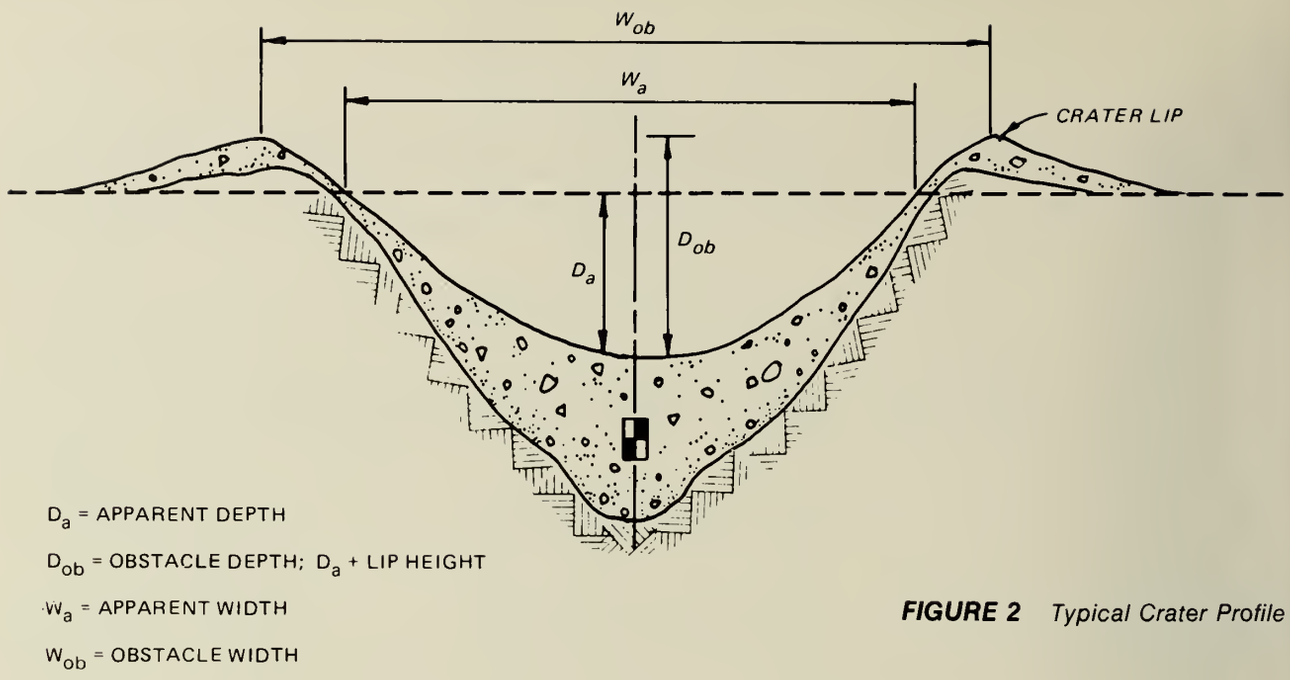

FIGURE 2 *Typical Crater Profile*

effects as a function of relative moisture content. In general, large effective craters can be blasted in wet, fine grained soils such as those at Aberdeen Proving Ground (sandy silt-ML), the Panama Canal Zone (clayey silt-MH) and Camp A.P. Hill (clayey sand-SP). Poor cratering results are obtained in dry soils such as those at Yuma Proving Ground, AZ (gravelly sand-SP), Fort Peck, (highly weathered shale) and Tooele Army Depot, UT (silt and clay CL-ML). Table 3 provides a means of relating approximate crater dimensions to relative soil moisture content. The dividing line between wet and dry soils for this table is a 10 percent water content and/or 50 percent saturation. As noted in the table, one can expect a considerable variation in dimensions even for shots fired in the same location.

The data for hasty and relieved-face craters is incomplete because I could not locate any test results for the performance of these designs in dry soils.

While crater effectiveness is related to crater size, the true measure of a crater's effectiveness is its ability to delay a vehicle. The test report published in 1963, mentioned earlier, provides what appears to be the only comprehensive study of tank mobility in standard Army craters. Some of the conclusions of that test program were:

TABLE 2

Results of Deliberate Road Crater Tests

Location	Soil Type	Apparent* Depth ft (m)	Obstacle** Depth ft (m)	Apparent† Width ft (m)	Obstacle†† Width ft (m)	Apparent† Length ft (m)
Para 3-17 FM 5-25	?	7 (2.13)	—	—	25 (7.62)	36 (11.0)
Ft. Peck, MT	Highly weathered shale	3.9 (1.2)	5.4 (1.7)	18.4 (5.6)	26 (7.9)	33 (10.1)
Aberdeen Proving Ground, MD	Wet sandy silt	8.1 (2.47)	10.8 (3.2)	24.5 (7.5)	35 (10.7)	40 (12.2)

* Depth from original ground surface to bottom of apparent crater.
** Maximum depth from lip crest to bottom.
† Width and Length of apparent crater measured at original ground level.
†† Width as measured from lip crest to lip crest.

TABLE 3

Expected Crater Dimensions For Ammonium Nitrate Explosives

	Crater Type	Average Apparent Depth ft/(m)	Range of Depths ft/(m)	Average Apparent Width ft/(m)	Range of Widths ft/(m)
Wet Soils* (clay, silt, clayey sand)	Hasty	6.5 (2.0)	5.5–7.0 (1.7–2.1)	19.5 (5.9)	15–23 (4.6–7.0)
	Deliberate	7 (2.1)	6.1–8.1 (1.9–2.5)	23 (7.0)	18–25 (5.5–7.6)
	Relieved Face	6 (1.8)	— —	23 (7.0)	— —
Dry Soils* (Sand, shale, clay)	Deliberate	4.2 (1.3)	3.5–5.5 (1.1–1.7)	17 (5.2)	13.5–18.5 (4.1–5.6)
* Soil Moisture:	Wet soil	Saturation ≥50% Water content ≥10%	Dry soil	Saturation <50% Water content<10%	

• that hasty craters are only marginally effective against modern tanks;

• deliberate craters are effective obstacles;

• that relieved-face craters are more effective than either of the other designs.

During the 17 years which have passed since the first test report was published, the deliberate crater has been tested in at least six test programs, and the relieved face crater in two programs. I have been unable to find any evidence of further scientific testing of the hasty crater. The deliberate crater has proven its effectiveness in wet soils, but is probably marginal to ineffective in desert soils. The two subsequent tests of relieved-face craters have raised serious doubts about the reliability of this design. A test program conducted by the 54th Engineer Battalion in 1969 concluded that the cratering method described in FM 5-25 will not produce a satisfactory relieved face crater. Another test program found that the detonation of the first row of charges disrupted the ring main of the second row, resulting in misfires. From a statistical point of view, additional testing of hasty and relieved-face craters would seem warranted.

FIGURE 3 *Optimum 15-lb shaped charge blast hole*

The current doctrinal definition of an effective crater is at best cumbersome. FM 5-25 states that road craters are effective if a tank requires *three or more* passes to traverse it. I believe that crater effectiveness should be defined in terms of how *long* a vehicle will be delayed in the crater, not how many passes it will take to traverse it. A reasonable criteria would be the time required to acquire a target, to launch an antitank missile, and to track it to the maximum effective range of the weapon. For present systems, 30 seconds is a reasonable minimum required time delay for a road crater.

Longer delay times are necessary for craters spanning multi-lane highways or for tank ditches where several vehicles can enter the crater (or ditch) at the same time. An upper bound is most likely that of a crater blasted in a four-lane highway. Assuming that four vehicles could enter the crater simultaneously and that only one AT weapon system would cover the ditch, a minimum delay time of two minutes would be required. On the basis of this simple analysis, it appears that road crater designs should provide time delays on the order of 30 seconds to two minutes. A table relating delay time to soil conditions and crater type would provide a valuable planning tool for defensive operations.

continued

The most significant time and labor factor in road cratering is the preparation of emplacement holes. While current doctrine (FM 5-35, ARTEP 5-145) recommends the use of 15-pound (M2 A3) or 40-pound (M3 A1) shaped charges to blast emplacement holes, many factors influence the overall time required to produce a usable hole. Since shaped charges require large stand-off distances to produce emplacement holes, valuable time is lost trying to jury-rig tripods or other devices to hold them at the proper height. In some cases, shaped charges blast deep, large-diameter holes which can be loaded with cratering charges with minimal cleaning (Figure 3). In other tests, the shaped charge detonation caused surface craters which filled the holes with loose base course material. Excavation of such holes is slow and tedious. The posthole digger is useful in removing rocky soil but it cannot dig or clean holes more than five feet deep. The hand auger can clean down to seven feet but is difficult to use where rocks in the hole exceed two to three inches in diameter.

FIGURE 4 *Pouring slurry into shaped charge blast hole*

In a series of cratering tests conducted at Raystown, PA, more than 85 40-pound shaped charges were used to blast emplacement holes. While the shaped charge jet penetrated at least six feet, virtually all of the holes required cleaning and it was found that a well prepared base course makes excavation particularly difficult. All of the holes blasted in a light duty road could be cleaned to five feet, but only 55 percent of the holes with a planned depth of seven feet could be cleaned to that depth. Tests were also conducted on a medium duty road which had a four-inch asphalt pavement over a four-inch crushed limestone base. Only 30 percent of the holes in this road could be excavated to design depth.

The problem of excavating shaped charge holes is compounded by a lack of hole diggers and augers. Road cratering is a squad task, but organic equipment includes only one post hole digger per squad and one auger per platoon. During a squad cratering mission, boreholes must be cleaned one at a time (unless reinforced with additional equipment) and the platoon's auger must be shared by three squads.

Given real world problems of fabricating shaped charge stands and cleaning emplacement holes with limited resources, road crater empacement time may well exceed the two hour planning figure found in most references. The Raystown test results indicate that crater emplacement time may vary significantly for different

sites. While it is possible for a squad to blast a hasty crater in an unpaved demolition range within two hours, it is unlikely that the same squad could blast a deliberate road crater in a well constructed paved road in the same length of time.

The performance of standard shaped charges presents a dilemma for the use of ammonium nitrate cratering charges. Forty-pound shaped charges reliably blast clean holes in thick (10-inch) reinforced concrete pavements which are deep and wide enough to load cratering charges. However, when these charges are used on thin (three-inch) concrete pavements, extensive concrete breakup and base course cratering fills much of the hole with debris. The 15-pound shaped charge blasts holes in most thin pavements and soil, but the hole diameters are normally too small for a cratering charge.

One product which offers a possible solution to the dilemma is the XM268 blasting agent. Testing of commercial slurry explosives has led to its limited procurement. The blasting agent is packaged as two inert components, a liquid oxidizer solution and a powdered fuel. They are mixed to form an explosive. It has been proven to be about 1.5 times more effective than an equal weight of TNT in producing crater volume.

In tests conducted at Yuma Proving Ground and in the Panama Canal Zone, deliberate road craters produced with XM268 had apparent dimensions approximately 20 percent deeper and 28 percent wider than those obtained with ammonium nitrate charges.

XM268 is denser than ammonium nitrate and has the consistency of a syrup which allows it to be poured or pumped directly into emplacement holes. This combination of superior density and fluid consistency allows XM268 to fill all voids within the emplacement hole and to form a more compact charge than ammonium nitrate cannisters. When shaped charges blast open holes, they can be loaded with slurry even if they are too small to load with ammonium nitrate charges. Figure 4 shows the XM268 blasting agent being poured through a 3½-inch diameter hole which was blasted with a 15-pound shaped charge.

Results of testing the shaped charge and the blasting agent suggest two design configurations—one for thick pavements and the other for thin pavements and unpaved roads. The *thick* pavement design uses 40-pound shaped charges to blast holes spaced 10 feet on centers as shown in Figure 1D. One hundred and twenty pounds of blasting agent is poured into each hole. Testing of this three hole deliberate crater design has shown that it performs at least as well as the standard deliberate road crater.

The *thin* pavement design is a modification of the hasty road crater design of Figure 1A. Fifteen-pound shaped charges are used to blast holes five feet on centers. Each hole contains between 50–80 pounds of XM268 blasting agent. The exact quantity would depend on actual hole size since blasting agent would be poured until either the hole is almost filled, or 80 pounds had been used.

These proposed designs minimize the number of blast holes that require cleaning. Balancing shaped charge size to pavement thickness insures that the majority of shots produce open holes. The blasting agent's fluid state is used to allow its placement in open holes too small for standard cratering charges. Note that these designs offer advantages even if the holes require cleaning. Since the thick pavement design utilizes a 10-foot hole spacing, there are fewer holes to clean. The thin pavement design uses just as many holes as conventional designs, but they are never deeper than five feet. Certain logistical and cost benefits are quantified later.

The M180 cratering kit (Figure 5) offers a substantial improvement in preparation time over other systems. Unlike conventional cratering procedures, the M180 does not require site preparation. Tests indicate that this system will reduce the time required to execute a crater from over two hours to less than 30 minutes under good conditions. During tests

continued

FIGURE 5 *M180 cratering kit*

FIGURE 6 *Single M180 crater in 7.5-inch concrete pavement*

at Aberdeen Proving Ground, three kit configurations produced craters which averaged 7.9 feet deep (apparent), 24.6 feet wide, and 29.1 feet long. The average crater for a five-kit configuration was 8.5 feet deep (apparent), 34.0 feet wide, and 37.5 feet long.

Comparison of cratering data from different test areas indicate that these dimensions are probably optimum and will be smaller for many soil conditions. M180 kits have been successfully fired through concrete and asphalt pavements up to 7½-inches thick (Figure 6). The M180 creates effective obstacles in wet soils but is apparently ineffective in dry desert soils. Training requirements for the M180 are less than those for standard cratering procedures.

While the M180 system will allow rapid cratering, certain factors limit its tactical use. Due to system requirements, no more than five kits can be fired simultaneously. Thus, the longest crater which can be executed at one time is approximately 36 feet (11 meters). This corresponds to a five-hole deliberate crater. This limitation, coupled with the M180's poor reliability in thick (12-inch) concrete pavements, indicates that the M180 will not reliably crater an autobahn.

In addition, the system requires electric initiation by a blasting machine with a 50-cap or larger capacity. The electric caps in the system are subject to premature detonation by any strong radio frequency (RF) source. Thus, the use of tactical radios and radar must be controlled where the set is used.

Furthermore, the kit's rocket motor cannot be fired if it becomes hotter than 130°F. Due to this limitation and cratering performance in dry soils the kit is probably not suited to desert operations. The M180 rocket motor and, to a lesser degree, its warhead are likely to burn or detonate when struck by small arms fire. These limitations must be considered in planning its tactical use.

TABLE 4

Road Crater Explosives Requirements (20 ft Roadway)

Type	Shaped 15-lb	Charges 40-lb	40-lb Crater Charge	TNT (lb)	BA (lb)	Packaged Weight lb (kg)	Packaged Volume ft^3 (m^3)
Standard Systems:							
Hasty		5	5	50		657 (298)	18.3 (0.52)
Deliberate		5	8	8		756 (343)	21.1 (0.60)
Relieved Face		7	4	94		798 (362)	22.2 (0.63)
M180			5 Kits			825 (374)	36.0 (1.02)
Proposed Systems:							
3-Hole Deliberate (Thick Pavement)		3		6	360	643 (292)	16.3 (0.46)
Modified Hasty (Thin Pavement)	5			10	400	609 (276)	15.3 (0.43)

It is questionable if the M180 is suited for reserved demolitions. While the kits can be quickly assembled, they cannot be placed on the roadway until all traffic has passed. This may well require final kit assembly and arming when enemy forces are close at hand. Since the M180 is electrically primed, an engineer squad either must give its blasting machine and firing wire to the demolition guard commander, or the squad must wait at the site and fire the device themselves. The assembled kits would be particularly vulnerable to small arms fire, mortars and artillery which could either knock the kits over or prematurely detonate them. In direct summer sunlight, assembled kits may require shade to keep their temperature below 130°F when exposed for long periods of time. Conventional crater systems are inconvenient and slow since they require closing the road to traffic during construction. But once the charges are buried and properly primed with a non-electric firing system, they may well prove to be much more reliable in closing a passage point at crucial time during battle.

Logistical efficiency is of particular importance to engineer units which must transport their Class V materials over long distances. Table 4 compares the logistics requirements for cratering a 20-foot (6.1-meter) roadway (and shoulders) with various systems. This table was compiled using the weights and volumes of *packaged* charges, since explosives are normally issued and transported in this manner.

For planning use, the weight and volume of mines should be added to these figures. General trends can be noted by comparing these values to those of the hasty crater. Deliberate and relieved face designs require about 15 and 20 percent more weight and volume, respectively. The M180 system weighs 25 percent more than the hasty crater explosives and requires almost double the volume. The proposed designs average about five percent less in weight and 10 percent less in volume. When weight is the limiting factor, there is at best a 35 percent difference in the number of systems per vehicle load. When volume capacity is critical (i.e., five-ton dump truck), a vehicle can carry almost twice as many hasty road crater systems or blasting agent systems as it can M180 systems.

TABLE 5

Estimated 1980 Procurement Cost to Crater a 20 ft Roadway

Type	Cost	Relative Cost
Standard Systems:		
Hasty	$ 1,675	1.0
Deliberate	1,860	1.1
Relieved-Face	2,095	1.3
M180	16,000	9.5
Proposed Systems:		
3 Hole Deliberate	855	0.5
Modified Hasty	1,255	0.8

At the user level, system cost is seldom considered. But cost impacts upon procurement and is also reflected in the amount of live fire training that can be conducted. Table 5 compares the estimated 1980 cost of cratering a 20-foot roadway (and shoulders) with various systems. The cost figures reflect either actual or estimated costs for purchasing all required items at current prices. The figures show a big cost difference between craters produced by blasting agent, present amonimum nitrate explosives, and the M180.

Conceptually, cratering is a simple process. Once the obstacle location has been chosen, an engineer squad prepares and fires explosive charges to create an effective obstacle within a scheduled time period. Unfortunately, not all test data agrees with doctrinal estimates of effectiveness and preparation time. While the effectiveness of the deliberate crater design in wet soils is well documented, performance testing of the hasty and relieved face designs is virtually nonexistant.

The few tests of the relieved face design indicate it is unreliable. In addition, all of our cratering systems are probably marginal to ineffective in desert environments. Our time-planning figures are probably too optimistic for our current level of experience in cratering actual roadways with squad-sized elements. Barrier plans and war gaming based on optimistic estimates will give a distorted view of engineer requirements and capabilities. While the M180 will provide a rapid cratering system, it is by no means an all-purpose device.

Many aspects of military cratering need additional research. Tables should be developed which correlate crater size and trafficability to soil conditions. It may prove necessary to develop two sets of crater designs, one for soils which are easy to crater and the other for less favorable soils. Emplacement timetables should be developed which relate construction time to the difficulty of producing emplacement holes. There is room for development of better hole blasting techniques, or even lightweight drilling equipment which could rapidly create emplacement holes. Elimination of heavy shaped charges from cratering systems would considerably lighten the logistical load. The XM-268 and the M180 offer distinct improvements over current products. But further research to fully measure the potential of these concepts and products seems justified. It is vital that engineers apply the best available technology to support the combined arms team.

Captain Robert D. Volz is presently assigned as a Research and Development Coordinator at the Waterways Experiment Station in Vicksburg, MS. Previous assignments include company commander, S-2, and platoon leader with the 54th Engineer Battalion (CBT), USAREUR.

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We have seen, in recent years, many instances of newly appointed noncommissioned officers (NCOs) not knowing what their job was or what was expected of them by their subordinates or superiors. We have also seen newly appointed NCOs who did not know what to expect of their superior NCO.

When the noncommissioned officer receives his first set of chevrons, he becomes a different individual. He is no longer "one of the guys," but the man his subordinates *look to for leadership*. He is no longer responsible only for himself but for all those who work for him. The NCO must know and live up to his duties and responsibilities at all times. The term, "That is not my responsibility," cannot be accepted if it concerns one of his subordinates, his unit, or the US Army.

To earn and maintain the respect and trust of his men, the NCO must prove he knows his job. This does not mean to merely know what the book says about a specific assignment, but to have the vision to see the completed task, and the ability to lead his men to that objective. The noncommissioned officer must have an open mind and be able to realize and accept new ideas and concepts. He must keep himself well informed by self-study, attending school, learning from superiors and peers and, last but not least, from subordinates. Remember, good ideas do not always come from the supervisor. Today's young soldier will not accept the reasoning "That is the way we have always done it," so we had better present a valid reason.

In addition to job knowledge, the NCO must know the overall unit mission. He must be able to explain the mission, how it is to be accomplished, who is going to do what, and the reason behind all actions. The good NCO will be able to answer these questions and employ his men properly to insure prompt mission accomplishment.

Too many times we hear complaints that individuals within a unit are not utilized properly. Before an NCO can properly utilize his personnel he has to know more than rank and last names. By knowing each individual's ability, personality, and patterns of behavior, the noncommissioned officer can readily assign duties and expect them to be accomplished. Other factors which should be considered are: conditions existing within his family; financial problems; complaints concerning the unit or other personnel within the unit. These factors can influence the actions or attitude of subordinates.

The Noncommissioned Officer

by CSM (Ret) Johnny W. Greek

Professional development of subordinates is another responsibility of the noncommissioned officer. By knowing the limits of their ability and their interest, he can provide educational guidance. In selecting an individual to attend school, the NCO must carefully consider the needs of the Army as well as the individual. Consider the man's past record as well as his demonstrated potential. Training received at unit level is even more important than school training. Unit level training conducted by the NCO must be conducted properly if it is to produce the desired results.

This does not mean there has to be a fancy classroom, charts, slides, and expensive training aids available. It does mean, however, that there has to be a needed subject, a competent instructor, and motivated personnel. The instructor must know his subject matter, rehearse the class, and be confident in presenting material to the students. The instruction presented must be needed by the students or they will have little desire to learn. Spend your limited training time with classes that help the student become more proficient in his job.

When presenting information, talk *to* the class. Don't talk above or below their level of understanding. If students are confused, they cannot learn. Whenever possible, use appropriate training aids. If the subject is operation of the M-16 rifle, have sufficent weapons available for each student. Since all classes cannot be conducted in this manner, the instructor should provide adequate training aids to maintain student interest.

Another type of training is disciplinary in nature. Most soldiers relate discipline to punishment, but NCOs cannot administer punishment. By definition, discipline is "a branch of knowledge or learning; training that develops self control, character or orderliness or efficiency."

To be concise, discipline means training, teaching, and learning. We should not confuse discipline with punishment. Disciplinary action to correct a discrepancy is corrective training and must be conducted where a discrepancy exists. If an individual is forced to perform a menial task in retaliation of a breach of discipline, he is being punished and is not receiving corrective training. Normally, due to lack of time during duty hours, corrective training is conducted during nonduty hours. This period of instruction must be conducted in such a manner as to teach the individual and not belittle him. One method of administering discipline is on-the-spot correction. In making on-the-spot corrections, always use courtesy and tact.

The good NCO will be available to his subordinates at all times and will insure they are aware of it. When a man comes to his superior for help, day or night, he expects to be helped. The NCO must be willing to give up much of his free time to assist the individual who is troubled because that soldier may not be around tomorrow to ask for help. When problems arise that he cannot solve, he must have access to his superiors or personnel trained to assist with those problems. The availability of all members in the chain of command must be established and publicized.

One area that could cause problems for the NCO today is the supervision of women. In the past, few NCOs had women under their direct supervision, but World War II brought the realization that women can perform most of the same military tasks as men. On the average, military women are more educated than their male counterparts. Even though most women do not have the varied experience of their male counterparts, they can just as easily be trained to perform essential duties. Once the woman has become accustomed to her unit, she must receive no special treatment or privileges or she will never feel that she has become a part of her organization.

As the NCO progresses in grade, so do his duties and responsibilities. The first step up in responsibility is the assigned duty as a squad leader. At squad level the NCO is in more direct contact with the working body of a unit than at any other level. The squad leader is the first link in the chain of command and in the NCO channel of communication. Through this channel, the squad leader transmits the pulse of the unit to his superiors. He must supervise his subordinates in daily activities and in the performance of special missions. He is responsible for the appearance, accountability, and training of his squad, and for the maintenance and accountability of all equipment issued to his squad.

The squad leader must set the example. He must maintain his appearance well within the limits set by accepted and prescribed policy. The overweight NCO can expect a negative response when he tells a subordinate he needs a haircut.

The squad leader must at all times be able to account for the members of his squad. Accountability includes the knowledge of where his people are, what they are doing, and when they are expected to return.

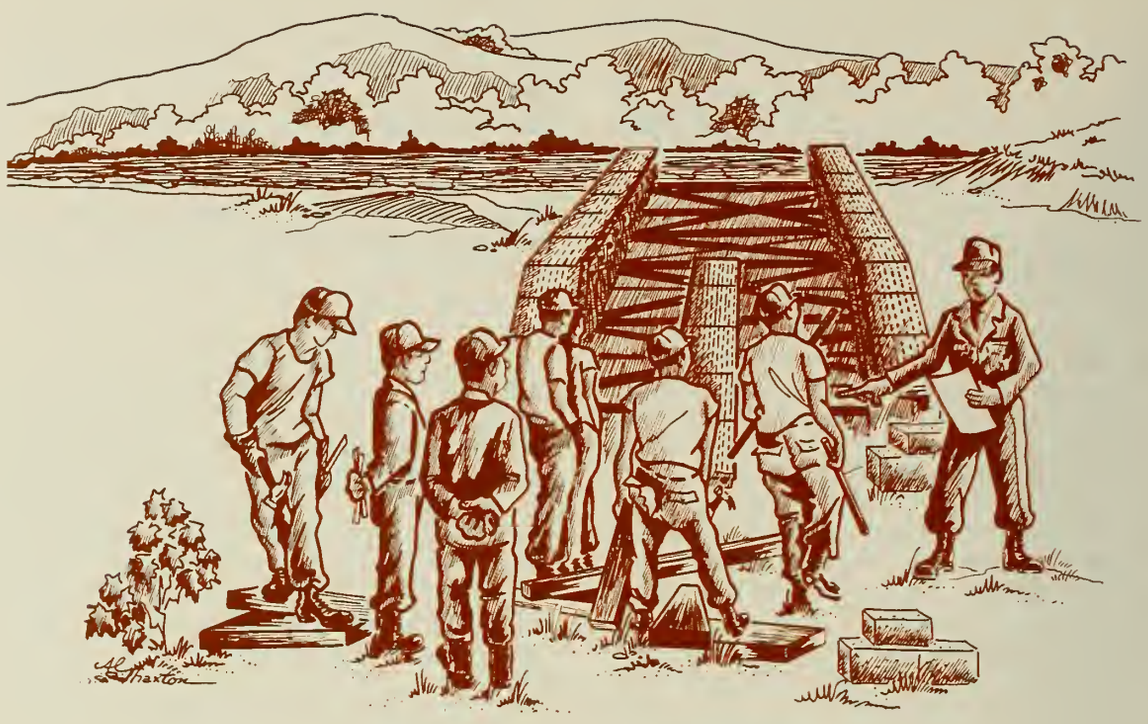
The squad, as the base element of the platoon, must be prepared to perform its mission at all times. This requires unit training, and is a responsibility of the squad leader. Training should include the cross training of individuals within the squad to enable the squad to function even during the absence of one or more members and under the most adverse conditions.

Normally, time is not available for formal classroom training, so the squad leader must be prepared to present impromptu or "tool-box" classes at any opportunity. Classes could be presented during breaks or while the squad is waiting to move from one location to another. Any time the squad leader has five minutes, he should be prepared to instruct squad members on subjects such as safety, personal hygiene, or maintenance of equipment. After all, it is the squad leader's responsibility to see the individuals' equipment is properly maintained.

These basic duties and responsibilities of the squad leader will consume most of his duty hours. During off-duty hours, he must prepare himself to assume the duties and responsibilities of platoon sergeant.

The platoon sergeant is the first step in the NCO channel of communication that has an officer as the immediate supervisor. Therefore, many of the duties will be prescribed by the platoon leader. The platoon

continued



sergeant advises and assists the platoon leader in supervising the performance of platoon members through the squad leaders. Most platoon leaders are young and inexperienced, and look to the platoon sergeant for guidance, instruction, and encouragement. It is up to the platoon sergeant to provide this leadership. He should not try to confuse or "snow" his platoon leader. It is only natural for a platoon sergeant to feel possesive toward his platoon, especially if he has been in the unit for a period of time, but possessiveness should not affect his relationship with the platoon leader.

The platoon sergeant further assists the platoon leader by relaying information to squad leaders, coordinating the efforts of squad leaders assisting in acquiring supplies and equipment needed, counseling personnel concerning promotions, job performance, reenlistment and personal problems, accounting for personnel by utilizing the squad leader's reports, and passing information up and down the NCO channel of communication. He must also assist squad leaders in the pursuit of MOS proficiency while, at the same time, preparing himself for advancement to the position of first sergeant.

The first sergeant is the senior noncommissioned advisor to the company commander. He must assist the commander in the operation of the unit, and advise him on all matters pertaining to the unit mission or personnel. Army Regulation 611-20 contains a long list of first sergeant responsibilities. In addition, he is responsible for and to every man in his unit and if he should ever become so mission-oriented that he forgets this, the unit will surely suffer.

The first sergeant is usually the most experienced man in his unit and should be able to assist in solving many problems that confront his men. The first sergeant should take every opportunity to be with unit personnel at work, in the field, or at play.

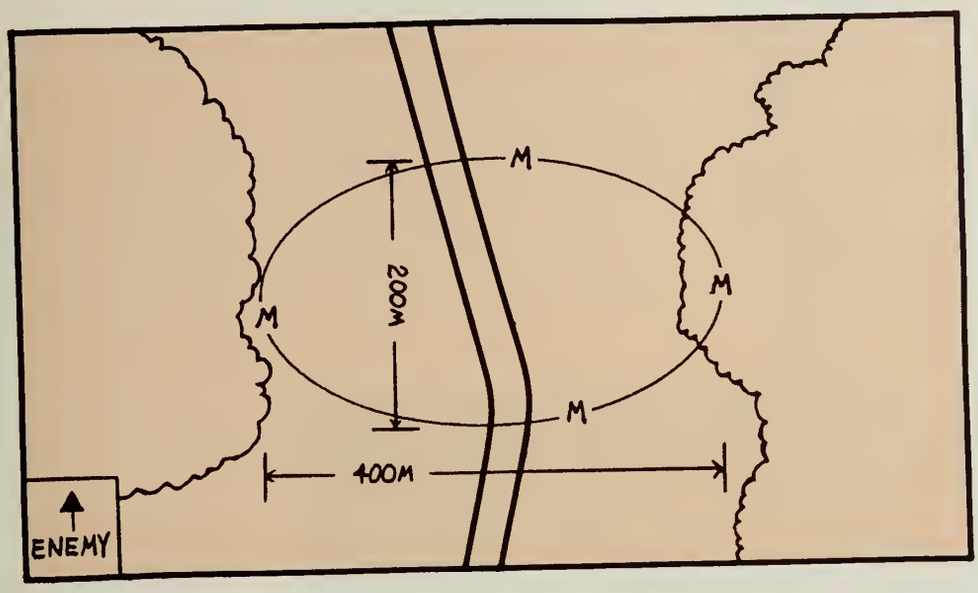
The command sergeant major, as advisor to the battalion commander, cannot afford to be tied to his desk. He, like the unit first sergeant, must know and be known, by everyone in the command if he is to advise the commander on their welfare and morale. One of his duties, listed in AR 611-20, is to "make note of observed discrepancies and institute appropriate corrective actions in the name of the commander." On-the-spot corrections should be made for the sake of discipline.

The last duties and responsibilities to be examined herein are those of NCOs assigned to positions outside the normal chain of command, including operations, intelligence, logistics, maintenance, and personnel activities at battalion level and higher, as well as messing, motor, and supply activities at company and troop level. Commissioned or warrant officers supervise these activities. Therefore, NCOs assigned to these activities must assume responsibility for the duties of their supervisor in their specialty area. Personnel assigned to TDA positions and positions created for short periods of time are in the same category as personnel assigned to special skill positions.

This was not intended to be a "laundry list" of duties and responsibilities, but rather a description of the most important NCO requirements. If the NCO performs these duties to the best of his ability and training, he will belong to a unit he can be proud to call his own. If he cannot live up to these requirements, then he is in the wrong profession.

Command Sergeant Major Johnny W. Greek retired from active duty in November 1978. He died in November 1979.

ENGINEER PROBLEM



You are a squad leader in Company A, 52nd Engineer Battalion (CBT). Your squad is conducting a reconnaissance mission in advance of division maneuver units. After a short period, you discover an enemy minefield 200 meters deep and 400 meters wide. Further reconnaissance reveals that bypassing the minefield would be impractical due to heavily wooded terrain on each side of the minefield.

Advising your commander of the situation, he instructs your squad to clear a footpath and a one-way vehicle lane through the minefield so that advancing units will not be delayed. You are given 10 hours to complete the mission. But you have only eight M157 breaching kits, 20 M1A1 breaching kits, and four squad members available due to other requirements.

Do you have the resources (personnel and equipment) to complete the mission within 10 hours? If not, what additional resources are required?

See THE SCHOOL SOLUTION, page 39

RESERVE COMPONENTS

SPECIAL WEEKEND COURSES

In continuing to provide training assistance to Active Component, Army National Guard, and Army Reserve engineer units, the US Army Engineer School (USAES) has scheduled weekend courses during FY 81. Each course will be approximately 12 hours. These are the only special weekend courses offered during FY 81.

The purpose of the program is to train officers and NCOs who will be conducting training courses in their respective units. Therefore, students attending these courses should be personnel who, by MOS or job assignment, are most likely to be responsible for conducting unit training in these particular subject areas. Selected students should also be familiar with the subject matter, since instruction is a fast-paced review and not designed for initial learning.

Enrollment in any one course will be limited. Application for attendance should be made in the same manner as for other Active Duty for Training (ADT) or Full Time Training Duty (FTTD). Units may wish to consider using IDT, with TDY, as an alternate method for sending personnel at reduced costs.

Units must verbally confirm availability of student allocations to the Unit Training Section, TMD, USAES, by calling AUTOVON 354-3008, commercial (703) 664-3008, or INWATS 800-336-3095, ext. 3008, before issuing orders to personnel selected to attend courses.

Qualified Army National Guard personnel interested in attending one or more courses must apply through their chain of command to the National Guard Bureau, Schools Branch, utilizing NGB Form 64.

Units which have been provided course allocations are responsible to insure attendance of those personnel. If circumstances preclude attendance, orders issuing headquarters must notify the Unit Training Section of cancellation as soon as possible, but not later than 10 working days prior to the start of class.

Orders should read: "For individual training with USAES Special Weekend Course 80-SP____". Individuals must report for inprocessing prior to 8:15 a.m. the first day of class. They will be released on or before 1:30 p.m. the second day of class.

Students must submit pay and travel vouchers at their home station per TRADOC Supplement to AR 5-9, dated November 21, 1978.

Inquiries concerning this program and the confirmation of class allocations should be directed to the Unit Training Section, TMD, USAES, by calling the phone numbers listed above, or writing to Commandant, US Army Engineer School, ATTN: ATZA-DTR (UTS), Fort Belvoir, VA 22060.

MISSOURI GUARD UNIT CONSTRUCTS BRIDGE

Sharpening their military skills while performing a public service, members of Company A, 110th Engineer Battalion, Missouri Army National Guard (Kansas City), construct a pedestrian bridge at Pom de Terre recreation area near Wheatland, MO. The bridge was one of several projects completed by the 110th for the Corps of Engineers and the Missouri Conservation Commission while conducting annual training at Camp Clark, MO.

CAPSTONE PROGRAM

The Army Capstone Program reached new heights this summer when top officials of the Army's Active and Reserve Components signed a Memorandum of Understanding at Headquarters, US Army Forces Command (FORSCOM), Fort McPherson, GA.

Capstone ties the peacetime training and planning of the Army's active and Reserve Components (RC) to stateside and European wartime needs. Its objectives are to improve training, mobilization, deployment, and management of the force. It forms Active and RC units into packages for wartime deployment.

The Memorandum of Understanding clarifies the role each component plays in carrying out the Capstone program. It also explains how command channels function under the program.

Department of the Army has directed

FORSCOM to implement Capstone. All commands involved in the program must establish planning and training associations with their Capstone units.

Gen. Robert M. Shoemaker, commanding general, FORSCOM; Lt. Gen. LaVern E. Weber, chief, National Guard Bureau; and Maj. Gen. William R. Berkman, chief, Army Reserve, signed the agreement.

MILITARY DUTY DEFINED

Medical management of incapacitation pay has presented a problem in the past to RC commanders. To clarify, the following current definition is offered concerning the return to "normal" military duties: "Normal military duty refers to that military duty for which the service member is qualified or for which he/she can be trained within the scope of his/her functional abilities and limitations as set forth in his/her physical profile. In this instance, the phrase "normal military duties" does not infer that the service member should be capable of performing the same duties performed prior to incurring the present injury and/or illness. In cases where medical evaluation alone is insufficient to establish the effect of an impairment upon performance of normal duties, the MTF commander should seek evidence from the member's unit commander to substantiate ability or inability to perform normal duties."

MOBEX 80

"Proud Spirit"/MOBEX 80 is scheduled for late fall. It is designed to evaluate the capability of CONUS command and control headquarters, and playing installations to command and support the mobilization of US Army Reserve and National Guard units. Unit level play will be limited to the preparation of unit data packets for submission to playing mobilization stations.

MORE MOS BONUSES

During fiscal Year 1981 the Selected Reserve Incentive Program (SRIP) is scheduled to incorporate several critical MOS in all Troop Program Units. Current plans call for bonuses for MOS 11, 12, 13, 19, 91, and 95B. This method of program expansion is considered the most constructive to achieve strength goals in the weaker part of the USAR structure. Instructions should already be in the hands of field units for implementation on October 1.

PREGNANCY

A change to AR 135-91 establishes the policy and procedures for processing members of the Army National Guard and Army Reserve who become pregnant.

NEW TERMS

The Ready Reserve is divided into three major categories: Selected Reserve Units, Pretrained Individual Reservists, and the Training Pipeline.

Selected Reserve Units (SRUs) are those organized to serve as units upon mobilization.

Pretrained Individual Reservists (PIRs) include trained individuals who have completed initial training and are not members of Selected Reserve Units. These augment Active or Reserve units as fillers or replacements upon mobilization.

Ready Reserve Training Pipeline (TP) consists of all Ready Reservists who have not yet completed initial active duty for training.

There have been numerous changes during the past year in the meaning of various terms applied to the Reserve Components. These changes are intended to clarify and simplify understanding and to improve the management of the Ready Reserve.

PX PRIVILEGES DOUBLE

In April, Post Exchange privileges doubled for members of Army Reserve and National Guard units.

Reserve Component members now earn one day of Post Exchange privileges for each four-hour drill weekend. For example, a two-day drill weekend earns the member four days of privileges. Red Reserve Component ID cards and leave and earning statements must be presented when using the Post Exchange.

ENGINEER RESERVES UNDERGO DIVER TRAINING

Specialist Four Luis Cabrera and Staff Sergeant Paul D. Loeffler inspect a diver before he enters the 33-foot training tank operated by the Fort Eustis Diving Detachment. Cabrera and the diver are members of the Army Reserve's 699th Port Construction Engineer Company from Puerto Rico that spent two weeks of active duty training at the Virginia installation. Loeffler is a member of the Fort Eustis Diving Detachment.

ENLISTED CAREER INFO

FULL TIME MANNING PROJECT

More than 1,000 soldiers on active duty will be assigned to Reserve Component (RC) units by the end of this month as part of the Army's full-time manning (FTM) project Additional assignments are expected in FY 81 and later.

FTM is aimed at improving the readiness of selected high priority Army National Guard and US Army Reserve units. The added full time soldiers will work in the personnel management, administration, training, maintenance, and supply areas. Guard and Reserve units have the same training standards as active units, which include performing level one missions, but they have only two days each month and two weeks of annual training to do it.

The only full time people in most National Guard and Army Reserve units are one or two civilian employees, Admin and Supply Technicians (ASTs) in each company-size unit, and additional supervisory technicians at battalion and higher headquarters. Eight percent are performing full time duty in support of the Guard, while only three percent of the authorized strength of the Army Reserve is in full time support.

The entire FTM project will provide more than 3,000 full time soldiers for the RC. In addition to the 1,070 active Army soldiers, 1,108 Guard members and 1,060 Reservists will be put on special three year active duty tours this year.

MORE E-3s TO BE PROMOTED

More E-3s may be promoted to E-4 under a promotion policy change, DA officials announced this summer.

Unit commanders will be able to promote E-3s to E-4 as long as the number of E-4s in a unit with 15 or more months service stays below 95 percent. In the past, promotions to E-4 stopped when the E-4 strength reached 85 percent of the E-3/E-4 total.

The reason for the change is the decline in the E-4 strength, officials said.

The current method of computing the number of E-4s allowed remains the same. Commanders may promote soldiers in the waiver zone (15–23 months service), providing the number in that zone does not exceed 20 percent of the E-4 strength. The limit is based on the actual or projected number of E-4s assigned to the unit and not on the total number allowed.

SHORTER OVERSEAS TOURS

Some junior soldiers will begin shorter tours in Europe or Japan October 1. First termers on a three-year enlistment who are not command sponsored will have to stay only 18 months. Soldiers now serve 24 to 32 months in these areas.

This change allows junior soldiers to serve part of their first enlistment overseas and part at a stateside post. It also shortens tours for those first termers who are already overseas. Under an adjustment plan, these soldiers won't have to serve there involuntarily beyond March 30, 1982.

Soldiers in a four-year enlistment and those who take their dependents overseas at the Army's expense will serve the present tour length.

An Army review board recommended the 18-month unaccompanied tour early in 1979. Army officials feel the reduced tour will improve morale among single and unaccompanied soldiers serving long tours away from the states.

CORRESPONDENCE COURSES

Soldiers, E1–E5, can now earn promotion points for completing Army correspondence courses, even in their primary MOS. One promotion point is earned for every five credit hours completed.

In addition to the traditional "home study" courses, soldiers may also earn promotion points by completing courses in three new programs—Supervised On-The-Job Training (SOJT), TEC Conversion Subcourses, and Group Study Correspondence Courses.

SOJT Subcourses provide hands-on training in specific skill areas. You don't just read about the skill or task, but actually perform tasks under the guidance of a supervisor or instructor.

Training Extension Course Conversion Subcourses involve the use of a TEC cassette and the Beseler Cue/See projector for study, followed by an exam for point credit. Many TEC Conversion Subcourses are still under development, but some are already available, like Engineer Subcourse 5524, the Universal Trestle.

Group Study Correspondence Courses involve group study under the direction or guidance of an NCO or supervisor. Examples of available courses are Engineer Subcourse 0501, Combat Engineer, and Engineer Subcourse 0063, Soils and Pavements.

Soldiers are, in increasing numbers, using Correspondence Courses to gain expertise in their MOS and to help prepare for their Skill Qualification Tests. Latest figures compiled by the Army Institute for Professional Development reveal that enrollment in the Engineer Correspondence Course Program is near 20,000 students.

The increasing popularity of Correspondence Courses may be due to the fact that all courses are self-paced, enabling the individual to work at his own rate. Self-paced instruction is used increasingly Army-wide, so that many soldiers are familiar with it.

Anyone interested should check out the courses listed in the Army Correspondence Course Catalogues (DA Pam 351–20) at their education center. A DA Form 145 enrollment application must be completed and mailed to: The Army Institute for Professional Development, US Army Training Support Center, Newport News, VA 23628.

OFFICER CANDIDATE COURSE

Branch Immaterial Officer's Candidate Course (BIOCC), formerly called Officer Candidate School (OCS), provides enlisted soldiers an opportunity to become Army officers.

Applicants to BIOCC must meet the following requirements:

—Be no more than 29 years of age at the time of enrollment.

—Be an enlisted member or warrant officer on active duty.

—Score at least 300 points on the Physical Fitness Test.

—Be a U.S. citizen or have lawfully entered the US for permanent residence. Military Intelligence branch applicants must be a US citizen.

—Have a GT score of at least 110 for males and 115 for females, score at least 115 on the Officer Candidate Test

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(OCT) and a minimum composite score of 200 on the OCT and Officer Qualification Inventory (OQI). (Females don't need the OCT and OQI.)

—Accept a three-year service obligation.

—Meet fitness standards.

—Meet weight standards.

—US citizens must have a favorable National Agency Check and non-citizens must have a favorable background investigation.

Graduates of the 14-week BIOCC at Fort Benning, GA, are commissioned as second lieutenants.

Applications for BIOCC class 2-81, scheduled to begin January 4, 1981 and graduate April 14, must be submitted by October 17, 1980. The cutoff date for submissions for class 3-81, scheduled for April 19, 1981 to July 22, is January 16, 1981.

Interested soldiers should contact their local personnel office for further details on eligibility and application.

WEIGHT ALLOWANCES

Officers and senior NCOs going on accompanied tours to certain areas in Germany are now able to ship more household goods.

Some soldiers are provided housing and furnishings by the Air Force. Due to a shortage of furnishings, E-7s and above assigned to Kaiserslautern, Ramstein, Landstuhl, and Sembach are now authorized the full joint Travel Regulations weight allowances for their grades.

Junior soldiers assigned to these locations and all grades assigned to most other areas in Germany are still limited in weight allowances authorized.

Soldiers should contact their local transportation office for details.

E-8 BOARD SLATED

An E-8 promotion board is slated to meet at Fort Benjamin Harrison, IN, in late October to select more than 3,000 master sergeants. Eligible E-7s on active duty with a date of rank (DOR) between November 1, 1975 and July 31, 1977 will be considered in the primary zone.

THE SCHOOL SOLUTION

EQUIPMENT

The M1A1 breaching kit contains one 15.24-meter section. Since the battlefield is 200 meters deep, you determine that 14 kits are required for the footpath. You have 20 kits, so there is no problem with the footpath.

The M157 breaching kit contains one 90-meter section. Since a one-lane vehicle path requires twice the number of kits as a footpath, and since four kits would clear only 180 meters, you determine that six kits are required to breach at least 200 meters. Again, sufficient equipment is available to accomplish the mission.

PERSONNEL

Since 3.5 to 4.5 man-hours are required to clear 100 meters with each M1A1 kit, it follows that 7 to 9 hours are required to clear a 200-meter footpath. Likewise, since 6 to 8 man-hours are required for each M157 kit, 36 to 48 man-hours are required for six kits. The total time required to clear a footpath and a one-lane vehicle path through the minefield is 43 to 57 man-hours. Since you have only four men and 10 hours in which to accomplish the mission, you should request additional personnel assets. At least two additional squad members are required to insure maximum efficiency and mission accomplishment.

OFFICER CAREER INFO

SCHOOLING CHANGES

The Department of the Army is changing the way officers are selected for Command and Staff College (CSC) level training, according to US Army Military Personnel Center (MILPERCEN) officials.

The Officer Personnel Management System (OPMS) changes, approved by Army Chief of Staff General Edward C. Meyer last April, also established a new Combined Arms and Services Staff School (CAS3) for training staff officers.

A new year group selection method will be used to select officers to attend CSC level training, according to DA personnel officials. The selection process will begin in academic year 1982-83 with officers competing within their own year groups for selection. Officials added that a two to three year transition period will be needed to implement the new selection plan.

Officials say captains in a nonpromotable status, officers between their 8th and 11th years of commissioned service (YOS) will be eligible for selection to attend CSC during their 9th and 14th YOS.

Each of the four year groups will be allowed a certain amount of seats for each CSC class. MILPERCEN officials say allocations will be: 15 percent to the year group in the 8th YOS, 15 percent for the 9th YOS, and 35 percent each for the 10th and 11th YOS.

DA will continue using the present 8-15 YOS selection system until 1983 while the new CSC selection plan is being phased in.

CSC selections between 1982 and 1983 for officers with 12-15 YOS will be based on how many of those officers have already attended CSC, officials say.

The mission of the new CAS3 is to provide active duty and reserve component officers training to serve as staff officers with Army field units. The CAS3 will teach officers what staffs do, what staffs are, and how staffs operate. Student officers will use their knowledge and skills in various simulated staff situations.

Officials added that the CAS3 program will be broken down into two phases. Presently, officials plan to include 120 hours of CAS3 resident instruction and a six-hour exam. Officers will then attend the resident CAS3 course TDY in their 7th, 8th, or 9th YOS. All officers must participate in the program and officers completing the nonresident phase will attend the resident CAS3 course. The nonresident course phase will be tested by the first three resident CAS3 classes before being put into the field.

The first CAS3 course is scheduled during FY 81 at Fort Leavenworth, KA., and about 120 officers will attend. Officials say that when the resident course is fully in gear in FY 85, about 1,200 officers will receive that training each year.

The exact length of the CAS3 resident course is under study by the US Army Training and Doctrine Command (TRADOC), Fort Monroe, VA. TRADOC is also studying the possibility of holding resident CAS3 courses at other locations.

Graduates of CAS3 may be picked to attend either CSC level training, Senior Service College, or both, officials say.

Other parts of the officer education system are also being studied, according to officials. These include expanding officer basic courses and developing military qualification standards. TRADOC is also preparing precommand courses and specialty courses for officers in place of officer advanced courses.

SENIOR RATERS AND THE NEW OER

Increasing the role of senior officers in the evaluation process is one of the major objectives of the new Officer Evaluation Reporting System (OERS).

The new system focuses attention on senior raters and charges them with the difficult duty of balancing their obligations to the rated officer with their obligations to the Army. Senior raters must prepare fair and honest evaluations which give each rated officer credit for his achievements and potential. At the same time, they must provide sufficiently realistic and discriminating evaluations to allow Department of the Army career managers and selection boards to make intelligent personnel management decisions.

Overall, senior raters appear to be accepting this added responsibility. There are, however, a few raters who are claiming that all of their officers are in the top 1, 2 or 3 percent of the Army. A senior rater runs the risk of losing credibility with selection boards with this type of inflated profile. In this regard, all officers, especially senior raters, should review the briefing given to selection boards on the new OER. Copies of this briefing were sent to MACOM commanders last April.

Another method the Army uses to emphasize the importance of the senior rater's responsibilities is the publication of the Senior Rater Profile Report (DA Form 67-8-2). Beginning this month, this report will be published annually and will show the rating history of each Army officer who has senior rated at least five different officers. A copy of this report will be sent to the senior rater and another copy will be placed in the performance section of the Official Military Personnel File (OMPF) alongside all of the senior rater's other performance documents. This is being done to highlight the fact that the evaluation of subordinates is one of the most important responsibilities of senior officers because of its impact on the selection of the future Army leaders. Therefore, the extent to which a senior rater fulfills this responsibility is in itself an indication of his or her performance.

SERVICE OBLIGATION

Officers who have been officially alerted for an assignment involving an active service obligation, and don't wish to accept the obligation, must request separation within 30 days of the alert.

Failure to follow the 30 day submission criteria will result in the officer being required to comply with assignment orders and the service obligation.

This policy also applies to Officer Advanced Course assignments and the Officer Advanced Course Advanced Assignment program. It does not pertain to officers selected for Command and General Staff College-Level and Staff Services College-Level schooling, including Warrant Officer Senior Courses.

For more information on elgibility and submission requirements, check AR 635-100 and 635-120 or call AUTOVON 221-7680/7889/8118.

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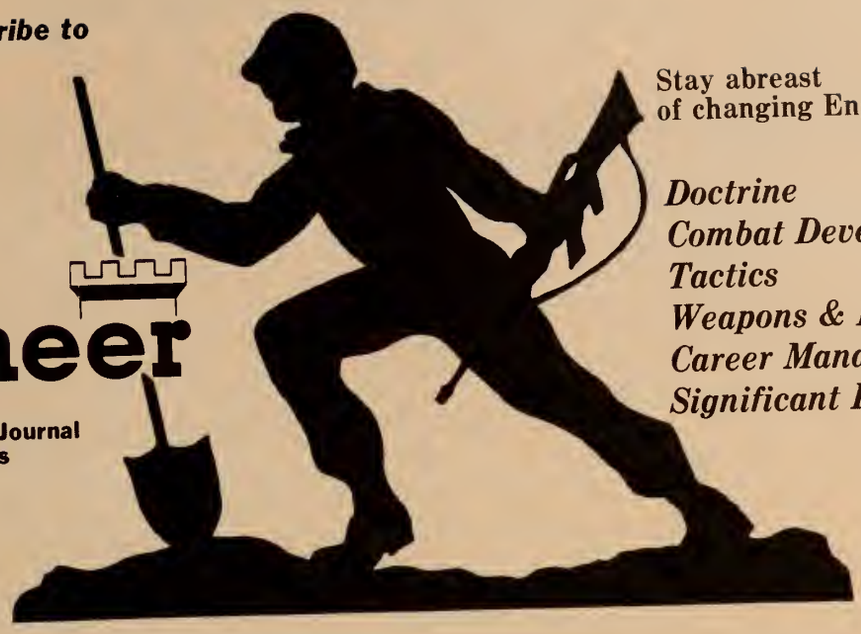

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"The Army's mission remains constant: to deter aggression through readiness and, should deterrence fail, to fight alongside our sister services and our allies and win. Deterrence, to be credible, requires a balanced military force capable of protecting our national interests wherever they are threatened and the unmistakable national resolve to employ that force if necessary."

General Edward C. Meyer
Chief of Staff of the Army

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Engineer

THE MAGAZINE FOR ARMY ENGINEERS

WINTER 1980-81

Engineers and Infantry

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THE COVER

Combined arms team members must work closely with and use engineers to enhance their own battlefield mobility, deny enemy mobility, and reinforce their survivability. Major General David E. Grange, Jr., examines the importance of teamwork between infantry and engineers in battle beginning on page 10. Cover art by Ron Perkins.

Engineer

THE MAGAZINE FOR ARMY ENGINEERS

VOLUME 10 WINTER 1980-81 NUMBER 4

FEATURES

10 **ENGINEERS AND INFANTRY IN BATTLE**
by Major General David E. Grange, Jr.

13 **MOLDING AN EFFECTIVE TACTICAL OPERATIONS CENTER**
by Major John W. Braden, Jr.

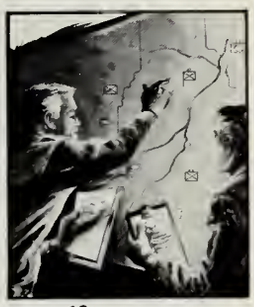
18 **SOMETHING NEW IN BRIDGING**
by First Lieutenant Dennis E. Linn

20 **THE ENGINEER MUSEUM: ARMY ENGINEERING IN RETROSPECT**
by Mary Vitek

22 **COMBAT ENGINEERS UP FRONT**
by Lieutenant Colonel Gerald C. Brown

27 **ENGINEER PREPARATION OF A POSITION**
by Colonel F. Palaguta

31 **INTEROPERABILITY IS MORE THAN JUST A WORD**
by Major Laurence R. Sadoff



page 13

page 20

page 32

DEPARTMENTS

2	NEWS & NOTES	35	RESERVE COMPONENTS
7	LETTERS	36	OFFICER CAREER TWO
8	FORUM	38	ENLISTED CAREER INFO
26	ENGINEER PROBLEM	40	THE SCHOOL SOLUTION

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NEWS & NOTES

US BUYS UK BRIDGE ERECTION BOATS

The United Kingdom Combat Support Boat (UKCSB) has been adopted by the US Army for bridge erection operations following 10 months of testing and evaluation. Selected on the basis of its compatibility with the US ribbon bridge, the diesel-powered, aluminum craft is shown here pushing an interior bay of the ribbon bridge into position. The UKCSB features a shallow draft, only 22 inches compared to 41 inches for the current US standard 27-foot bridge erection boat it will eventually replace. It is also 27 feet long, has a top speed of 25 mph, and is unsinkable. Like the US model, it can be carried and launched by the ribbon bridge transporter fitted with a cradle. The UK boat will be delivered to US Army units beginning in November 1981.

AWARD AUTHORITY DELEGATED

The Department of the Army has approved a change concerning the award authority for the Good Conduct Medal. Company, battery, and troop commanders are now authorized to award the medal to deserving soldiers. Formerly, award authority was reserved for general officers and field grade officers. The recent decision to further delegate award authority of the Good Conduct Medal places authority at the proper level to promptly recognize soldiers while maintaining the integrity of the award.

WARRANT OFFICER TERRAIN ANALYSIS COURSE

A new Warrant Officer Terrain Analysis Course, conducted by the Defense Mapping School at Fort Belvoir, VA, will provide the Army with its first Terrain Analysis Technicians (841A). WOTAC graduates will serve as leaders of newly formed Division Terrain Teams, occupy positions on Corps and Theater Army Terrain teams; and serve in operations sections of Topographic Battalions. The 15-week course includes nine weeks of terrain analysis instruction, one week of instruction on the Analytical Photogrammetric Positioning System (APPS), three weeks of weather analysis, and two weeks of cartographic/graphic arts instruction. After graduation from WOTAC, new Terrain Analysis Technicians will be required to attend a two-week Warrant Officer Orientation Course at Fort Rucker, AL. Course prerequisites include the requirement that selected NCOs possess one of four MOS: Cartographer (81C), Surveyor (82D), Meteorologist (93E), or Image Interpreter (96D). (WOTAC 1-80 began on 27 August and concludes 18 December.)

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continued

BAGGAGE RATE CHANGES

The Military Airlift Command (MAC) began last October to base baggage allowances on the number of pieces shipped rather than the weight. Passengers flying on military and MAC contract charter flights can check two pieces of baggage free. Each piece may not exceed 62 linear inches (Length plus width plus height) nor 70 pounds. One piece, not to exceed 45 linear inches, may be hand carried onboard. Before, a passenger was limited to 66 pounds of baggage. Passengers exceeding the free baggage allowance will be charged a flat rate of 18 percent of the MAC passenger fare. Those who are authorized excess baggage will also pay the 18-percent rate if they exceed their limit. The flat rate will be assessed if a bag exceeds size or weight limits. Duffle bags will be accepted as an authorized single piece regardless of weight or size. Passengers flying on a space-available basis will be allowed two pieces of checked luggage not to exceed a combined weight of 66 pounds. When pet shipment is authorized, the pet is considered excess in all cases, and a flat rate will be assessed for each increment of 70 pounds, regardless of the dimensions.

ENGINEERS PULL TOGETHER

Engineer soldiers of D Company, 249th Engineer Combat Battalion (Heavy), pull together when they're given a construction assignment. One of their most recent construction projects was a 5500-square-feet controlled environment steel and masonry building to house the 25th Data Processing Unit in Schwetzingen, Germany. D Company engineers are shown here preparing the concrete foundation for the building. The 249th is headquartered at Gerszewski Barracks in Karlsruhe. (US Army photo by SP4 Frank Lyles)

NEWS & NOTES

NEW PT PROGRAM

Army Chief of Staff General E.C. Meyer has approved a new PT Program for personnel over 40 years of age. It includes an emphasis on cardiorespiratory fitness and body composition (reduction of fat); a six-month get-in-shape period after medical clearance; and a diagnostic of current fitness levels with prescribed intensities for appropriate workouts. The new PT test for over-40 personnel is "Go/No-Go" and presently consists of a two-mile run. Substitute tests for those whose medical profiles restrict running include swimming, cycling and walking. A by-product of the program will be the implementation of new procedures in the biennial physical examination for those over 40. The procedures will include a comprehensive heart attack risk analysis to assist doctors in providing sound medical advice to individuals and commanders.

RETIREMENT APPLICATION RULES CHANGE

Officers and enlisted soldiers may now apply for retirement up to 13 months before their retirement date. Changes to AR 635-100 and AR 635-200 permit soldiers to apply for normal voluntary retirement and retirement in lieu of PCS once they have completed 18 years and 11 months of active federal service. Those who apply more than six months early must request a retirement date no later than the end of the month during which they attain 20 years of service.

Soldiers requesting retirement to avoid a PCS have 30 days from the time they are notified to apply for retirement. Enlisted soldiers are notified in writing. Officers may receive written or oral notification.

SECURITY FENCE GOES UP

Three line companies and a headquarters contingent of the 299th Engineer Combat Battalion (Corps), stationed at Fort Sill, OK, provided the expertise and muscle to construct more than four miles of security fence at Fort Chaffee, AR, during late August and early September. A total of 185 soldiers worked in two 12-hour shifts around the clock for 22 days to complete the project in 30 percent less time than officially allotted for such projects. Fort Chaffee is now the primary relocation center for Cuban refugees in the US.

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BRANCH TRAINING TEAMS

Branch Training Teams (BTT) have been activated by TRADOC to work as the primary interface between units and Branch Schools. As part of the BTT program, each school will visit representative proponent units to: inform the unit of current Branch School products, processes, and concepts; assist the unit in applying school products toward their training program, in conjunction with the Battalion Training Management System; and collect training and combat development data that will enable the schools to better serve the needs of the unit. A test of the program ending last summer had 15 service schools, in cooperation with HQ FORSOM, visit more than 170 units. The feedback reports were unaminous in their assessment that the program helped the training environment within the unit, as well as focusing attention on school products and processes that may need changing. Schools will be conducting an expanded program during FY 81 with visits scheduled for Eighth Army, USAREUR, Reserve Component units and FORSCOM.

NEW STORAGE FOR POMCUS

Soldiers assigned to the 249th Engineer Combat Battalion (Heavy), 18th Engineer Brigade, Karlsruhe, Germany, prepare to work on the interior of a new storage structure. Last March, these soldiers began the mission of constructing 26 Stress Tension Structures to provide storage space for POMCUS (Prepositioned Materiel Configured to Unit Sets) military equipment in Northern Germany. The buildings, procured by the US Army Troop Support and Aviation Material-Readiness Command, are among the largest prefabricated structures ever erected by a troop unit. Each of the huge buildings is comprised of more than 22 tons of steel and 30,000 square feet of nylon fabric covering and is capable of providing more than 20,000 square feet of storage space. (Photo by PFC Carl H. Foschi)

NEWS & NOTES

SQUAD ASSAULT COURSE

Soldiers of the 17th Engineer Battalion, 2nd Armored Division, cross Fort Hood's Cowhouse Creek in rafts on the first leg of the battalion's new combat engineer assault course. Designed to provide realistic training in offensive tactics, the course requires many of the same tasks that engineers are required to perform in a combat environment. Along the way, they must fire their individual and crew-served weapons, fire bangalore torpedoes, use smoke for concealment, and demolish a bunker with explosives. (US Army photo by Jack Raudy)

NEW WATER DISTRIBUTOR

Combat heavy battalions and construction support equipment companies will soon receive the 6000 gallon semitrailer mounted water distributor system recently type classified as a standard item of Army equipment. The semitrailer mounted system will replace the truck-mounted water distributor system presently in the Army inventory and provides a six-fold increase in water capacity. This increased water capacity will provide the Army with a maximum compaction capability. The distributor will be employed worldwide with the initial fielding due to be completed by April 1981. The system will be used to supply water for soil compaction and dust control, and to provide a limited fire-fighting capability. A liquid-cooled Perkins diesel engine mounted at the rear of the distributor directly drives its 600 gallon-per-minute centrifugal pump. The spray system is made up of two nozzles that can produce a fan type spray pattern covering a swath up to 70 feet wide. The semitrailer mounted distributor is towed by a standard military truck tractor. A remote control panel is used to operate the system from the tractor's cab.

LETTERS

Dear Sir:

I am disappointed that "Tactically Qualified, Technically Proficient" was published in the Spring 1980 issue without editorial comment.

The first part of the article is basically a summary of current engineer tactical doctrine. Although nothing new is presented, at least the summary is accurate. However, it is when the author starts discussing command and support relationships that I believe he fails to keep reading the very same manuals he was so aptly summarizing.

I question his sweeping conclusion that more efficient and timely engineer support can be provided maneuver commanders via a command relationship of attachment. In addition, his figure illustrating the lengthy tasking channels for a corps engineer battalion DS to a division is wrong. In developing his argument, CPT Robertson forgets both the role of the division engineer as well as the definition of direct support.

To allow us all to have the same frame of reference, I would like to use a few extracts from FM 5-100, 30 March 1979.

a. p 2-9: "Whatever command relationship may be established between corps engineers and the division, **three cardinal principles apply for engineers operating within the division area of operations:**

(1) The thrust of engineer effort is forward, with the corps engineer elements habitually working as far forward as the brigade areas.

(2) The concept of normal association is followed in that the same engineer units, as a matter of normal procedure, operate with the same maneuver element.

(3) All engineers operating within the division area of operations are coordinated or directed by the division engineer as the single engineer point of contact for the division commander. Within the brigade areas, the normally associated divisional engineer company commanders (brigade engineers) normally perform this coordinating or directing function for the division engineer and act as the single point of contact for brigade commanders...."

b. Likewise, under the Command and Control section, p 4-28: "The division engineer:

(1) Commands the division engineer battalion.

(2) Coordinates or directs the total engineer effort in the division area including the effort of engineers from corps."

c. p N-3: Direct Support.

"Direct support is defined in JCS Pub 1 as follows:

> A mission requiring a force to support another specific force and authorizing it to answer directly the supported force's request for assistance.
>
> An engineer unit placed in direct support provides liaison with the supported unit commander on engineer matters, and takes support requests directly from the supported unit. In case of engineers operating in a division area, the division engineer and the brigade engineer are the single engineer points of contact for the supported maneuver commander.
>
> Corps engineer units operating in a direct support role in a division area establish liaison with, advise, and take support requests directly from the engineer single point of contact in whose area they are operating. Command responsibility is retained with the parent engineer unit unless the direct support engineer unit has been attached to the supported unit for certain logistic functions, e.g., rations and POL."

Operating within the framework, corps engineers coming to the division with a command relationship of DS, OPCON, or attachment can have their assets shifted by the division engineer. Only requests for additional personnel or equipment not originally supporting the division must be relayed to the parent engineer headquarters (group or brigade). Reallocation, readjustment, and reinforcement of engineer effort is best requested through engineer channels for speed as well as quantification of the need. If the brigade engineer cannot satisfy the request with his assets (divisional as well as nondivisional) he forwards the request for the division engineer. Command channels requests are not required by doctrine, nor are they normally used in the real world. If requests do come through command channels, from a maneuver unit with a DS engineer, this is an indicator that some supporting engineer hasn't been doing his job!

Let's not forget that when engineers are attached to a maneuver force, the ability of the engineer one level higher to reallocate assets is severely restricted. Now requests must, in fact, go through command channels. For example, if all engineers supporting three committed brigades were attached, a simple action such as moving a dozer from the 2nd to the 1st Brigade would have to be accomplished via a G3 tasking. This lack of flexibility is exactly what the current engineer system is designed to avoid.

Logistical support for widely dispersed DS engineer units is a problem; however, attachment is not a cure-all. Tank and infantry units cannot completely support our equipment. Some parent unit support always has to be provided. However, we need not despair, as most units faced with this support problem have been able to develop workable solutions. As an example, the 1st Armored Division FSOP specifies that DS engineers receive Class I, Class III, common parts of Class IX, and maintenance and recovery support from the supported maneuver unit. Unfortunately, peacetime logistics restrictions prevent this support from being as complete to corps engineers as it is to the divisional battalion, but progress is being made in this direction. This is the way we train, and this is the way we plan to fight.

In summary, FM 5-100 gives combat engineers and maneuver commanders a tested, workable method of utilizing engineer support in order to effectively multiply combat power. Some situations dictate that engineers should be attached to maneuver units. However, DS is normally preferred since readjustment of engineer effort is quicker and simpler. Logistics problems inherent in DS can be and are being overcome in the field. The publication of FM 5-100 has been long overdue. However now that it is in print, we should all read and understand it before proposing changes.

Joseph P. Kish
LTC, CE
16th Engineer Battalion

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FORUM

Compulators

An argument for the acceptance and use of calculators by Army engineers

by Captain Trent Keeble

The time is near for the merging of two different technological fields—computers and calculators. We think of calculators as very portable, and sometimes very versatile adding machines, but not much more. We perceive computers, on the other hand, as a massive array of wires and diodes that solve some of the world's most difficult and complicated problems. We have kept the two separate in our minds primarily because of the vast differences in capabilities. Slowly but surely the technology to mature a calculator into a computer is evolving and the differences wane. What will happen when we finally have a calculator that is as versatile as a computer was just a few years ago?

When calculators first appeared on the open market they were very simple and expensive. But gone are the days when a simple four-function calculator sold for $135. Today, the same capabilities are packaged in a calculator that is credit card thin and retails for under $30. Such prices have allowed calculators to become a common household or school item.

Everyone is affected by them to some degree, good or bad. They are quick and reasonably reliable. They also lessen the element of human error. Such reliability and accuracy, however, lulls us to the point of forgetting principles underlying basic mathematics (and even higher levels with some of today's advanced scientific or business calculators).

We can either view calculators as a tool or as a crutch. As a tool it has a valuable place in the scientific and business communities. It can be used to manipulate data and/or variables to arrive at different solutions. This ability provides a basis upon which to make decisions. The more reliable the data, the more confidence in making a decision. Calculators can provide the confidence.

But what of computers? When computers began to find their way into the everyday

usiness and scientific worlds, people were awed y their power. Some people misconstrued them o be the answer to too many of the world's problems. But the passage of time has radically hanged this viewpoint. We now consider computers as a necessity. Our original fears of the omputer contrast sharply with our present ideas f calculators. We sell short the calculator and ts future. We thought too much of computers hen, and think too little of calculators now. We hould have learned from the computer experience to respect calculators as tools (and imited ones at that) with practical uses now and a great potential for the future. We should not overreact.

Eventually, the calculator will be able to perform many complex and difficult mathematic manipulations (something similar to a minicomputer). Then we will be faced with an even greater challenge. We must become even more receptive to the use of computers. We have already felt the immense impact of computers in our society—bank statements, bills, moon landings, magazine subscriptions, check-out systems in stores, television, and telephone systems. The impact will be even greater when calculators with comparable abilities to computers are developed and marketed to the public.

We will be forced to change our views of calculators. They will not fit our current concept of calculators. They will be *computers* that fit into the palm of one's hands. We must be willing to grow with the changes and mold those changes to our benefit.

With all this in mind, how should we view calculators in today's Army, and specifically in the engineering fields? We can view them as fancy adding machines. However, I would prefer to see calculators designed to ease management, designing, and administrative burdens. I foresee calculators being readily adapted to: calculating logistical requirements; classifying roads and bridges; designing roads and airfields; CPM; pipeline design; bridge design; ADM; NBC; 2715 and 2406 reports, just to name a few adaptations.

What prevents the use of calculators by today's Army engineers? A lack of interest, funds, fear, or is it a lack of foresight?

At present, the Field Artillery has incorporated programmable calculators into the FADAC, but calculators do not and cannot replace the FADAC. Rather, they support its mission by solving gunnery problems and providing backup. West Point is seriously looking into the possibility of issuing programmable calculators to cadets.

Army engineers, on the other hand, use programmable calculators in only a few areas. Topographic units and surveying teams use them. Some programs are developed for ADM, but not enough. The Construction Engineering Research Laboratory is now conducting research concerning areas of application. But even after applicable areas are identified, how are calculators going to be introduced into the field and who should use them? The US Army Engineer School has not taken steps to include calculators into the Officer Basic or Advanced Courses. So how will a knowledge transfer occur?

Calculators possess a great potential for current application and an even greater potential for the future. With the advent of "bubble chip" technology and other breakthroughs, calculators will certainly evolve into small computers. These new calculators will most likely have many peripherals as options similar to the options on a car. Just like computers, calculators will be able to interface across telephone lines, use cathode-ray tube displays, have X-Y plotters, be capable of expendable memory, and become a portable timeshare terminal. That is a phenomenal amount of power. It is a power that we can use to our benefit, not detriment. Engineers on the battlefield will be able to derive quicker, more accurate estimates upon which to base decisions. There is little doubt that time will be at a premium during the next major battle.

So what should we do about it? We should be willing to change our concept of calculators as technology continues to progress. We should search for realistic engineer areas of application and use the calculator to our benefit. Now! This resource is barely tapped in the military engineering field, yet deserves serious consideration by anyone heading toward a battlefield. The use of calculators on the battlefield is something we must support as a collective whole. The potential of calculators lies in mass usage, not in selective usage. In order to win the next battle we need all the weapons available to us, and one of those weapons is knowledge. Calculators can add to our knowledge.

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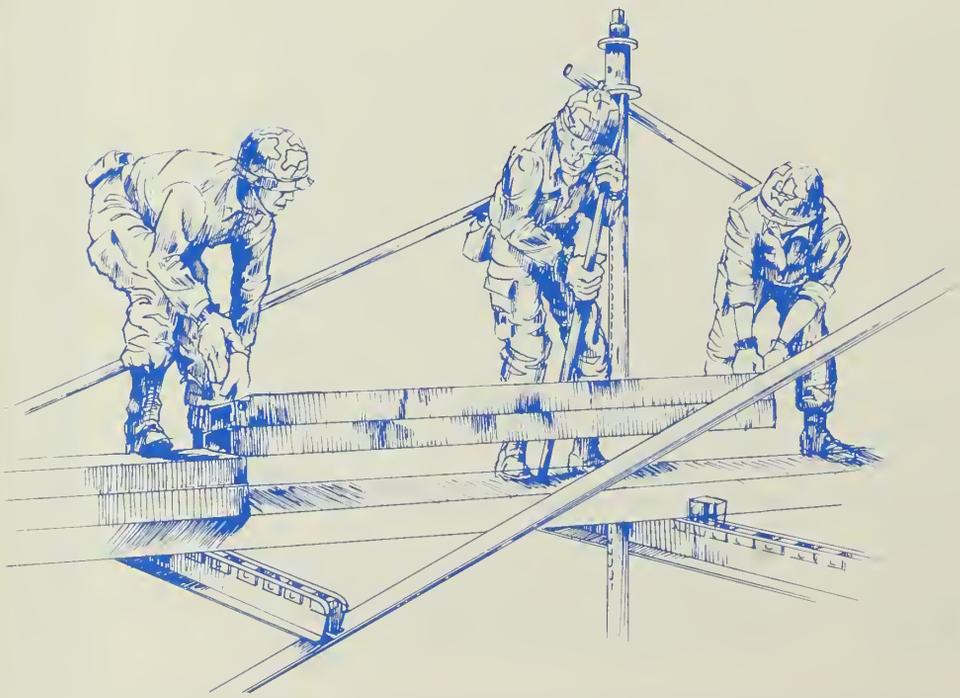
Engineers and Infantry in Battle

by Major General David E. Grange, Jr.

EDITOR'S NOTE: The following article was published initially under the heading, "Commandant's Notes," in the September-October 1980 issue of INFANTRY magazine. It represents a keen awareness of engineer capability on the battlefield by other members of the combined arms team.



The 1973 Arab-Israeli War emphasized the importance of combined arms operations and force mobility in modern warfare. This article is designed to focus on two elements of the combined arms teams that are critical to operations and force mobility—the infantry and the engineers. Infantry contributions as part of the combined arms teams during the 1973 War were magnified by the efforts of the engineers who constructed artificial hills, assault bridging platforms, antitank ditches, minefields, and combat fortifications, and those who also did occasional duty as infantrymen when they were needed "up front" with the assault forces.

In the event of war in Europe, United States forces will most likely be in a defensive posture during the initial outbreak of hostilities. Early warning, time, and enemy tactics will determine whether they fight from hasty or prepared positions; it will probably be from both. Our commanders must organize their resources and take the fullest advantage of the key terrain in their areas. They must carefully employ their weapons and maneuver their forces to bring the full effectiveness of their weapons to bear on the enemy. They must also see to it that their units do everything possible to survive the effects of the enemy's weapons.

Covering forces have two missions: to destroy the enemy while causing him to deploy early and expend his breaching and bridging capability, and to gain time for defensive preparations in the main battle area. In the main battle area the enemy must be canalized and held in the firing corridors and kill zones of our weapon systems. Both the covering and MBA forces need to disrupt and slow enemy formations, separating the enemy infantry from their tanks and destroying their armored vehicles.

To accomplish this task, combined arms team members must work closely with and use the engineers to enhance their battlefield mobility, deny the enemy mobility and, throughout the battle, reinforce their survivability through a combination of terrain, weapons, and obstacles.

We should use natural obstacles, reinforced with mines and manmade obstacles, to deny the enemy cover and concealment by canalizing him into selected areas where we can best use our weapons to destroy him or to force him to abandon his offensive. Whenever possible, positions must be established for our antitank systems to take advantage of their full range potential and to provide opportunities for flanking fire. The engineers can help immeasurably in these tasks.

But, to fully use our limited engineer resources (there will never be enough), commanders must establish a priority of work that is derived from their perception of how the battle is to be fought. On the basis of the commander's visualization of the battlefield, the engineers can prepare obstacles to support weapon systems and killing zones in the order in which they will be required to increase the lethality of our weapons.

To establish a priority of tasks for engineer support, a commander starts with the antitank weapons, which are the initial building blocks for the defense, and then determines the positions for other crew-served weapons, tanks, armored personnel carriers, command posts, individual fighting positions, and communications trenches. The best way to dig in vehicles and weapons is to use engineer bulldozers, combat engineer vehicles, and front loaders. Engineer backhoes are also useful in preparing crew-served weapon positions, individual fighting positions, and communications trenches. Engineer chain saws are useful to cut log beams for overhead cover, to create small obstacles, and to clear fields of fire. Camouflage nets, enhanced by natural foliage, when combined with good light and noise discipline, will improve the security and effectiveness of battle positions.

Engineer efforts before a defensive battle are usually divided between battle position development and the emplacement of obstacles. During the battle, engineers will be tasked to command-detonate mines, to close lanes in obstacles, and, if need be, to reinforce the defense by becoming infantrymen.

During a movement to contact, the engineers must be up front with the infantry and armor, clearing the way by removing roadblocks, downed trees, and rubble, breaching minefields, making quick bypasses around obstacles, and crossing ditches with assault bridging. Frequently, combat engineers will accompany infantry patrols to determine the location and dimensions of threat obstacles.

Since a modern army requires a constant resupply of items to maintain the momentum of an attack, engineers will also be tasked to create or repair the supply routes for reinforcements, supplies, and vehicles within the battle area.

Combat in cities demands an even closer relationship between the infantry and the combat engineers. During military operations in urban terrain, engineers with infantry support will remove bothersome obstacles along the route to the built-up area. Within the built-up area, engineers will be tasked to breach walls, remove boobytraps and antipersonnel mines, mark gaps and routes, clear rubble, and maintain passages for combat vehicles. The demolition gun on the combat engineer vehicle (CEV) is excellent for many of these tasks.

Defense in a built-up area presents a new set of chores for combined arms teams. Obstacles must be planned in depth and must include rubble, minefields, and roadblocks. Cratering for roadblocks can be accomplished by filling existing sewer lines with explosives to form hasty craters. The CEV demolition gun can create rubble from buildings to impede enemy ground and mounted attacks. Infantrymen and engineers can work together to construct battle positions at key points such as corner buildings or to dig communication trenches between critical battle positions.

When augmented with additional equipment from their battalion, combat engineers can construct fortifications and emplacements for the defense. A combat engineer battalion can also provide an armored vehicle launched bridge (AVLB) or improve emplaced bridges in support of combined arms operations. Engineer bridge support provides the extra combat mobility for counterattacking forces to position themselves at the right places to destroy the enemy.

When performing assaults on enemy positions, engineers are located with the lead elements of the attacking platoons. Infantrymen

and engineers, using natural cover and concealment aided by smoke and indirect fire, work together to breach obstacles by clearing antipersonnel mines and barbed wire entanglements, marking lanes, providing local security, and neutralizing enemy weapon emplacements, bunkers and pillboxes. To complete the breach, engineers follow up with minefield clearing devices or combat engineer vehicles (CEV) and bulldozers to complete the penetration and destruction of fortifications and to help combat vehicles get through the defensive belts. To overwatch the assaulting and breaching forces, a support force is normally established consisting of tanks,

continued

IFVs, TOWs, and, of course, indirect fire weapons.

Working with engineers, individual infantrymen can assist in breaching minefields to provide additional lanes for follow-on forces. If mine detectors and other mechanical means of neutralizing minefields are not available, the men can breach them by probing an area for a footpath and marking mines. The marked mines are then destroyed in place and cleared lanes are marked to provide safe corridors.

Maneuver units should take as much interest in training with engineer support units as they do with the other members of the combined arms team. Carefully planned and realistically executed combat tasks such as breaching and constructing obstacles and conducting river crossings, should be integrated into ARTEPs, FTXs, and other training exercises. At the same time, engineer units would gain more knowledge of infantry missions. Infantry units should also be capable of employing expedient obstacles when engineer support is not readily available. Road craters, log hurdles, and log post roadblocks are typical antiarmor obstacles and have good potential. The most interesting training for the infantry and the engineers is the small squad- or platoon-sized drills that bring them together on day or night patrols to locate and reduce obstacles.

Last, but certainly not least, the engineers must know how to fight as infantrymen. Many a desperate fight by a U.S. task force has been won by the timely appearance of combat engineers as a reinforcing infantry force. Commanders should provide opportunities for engineers to serve in infantry roles on every field exercise. It is vital that this skill be kept alive and well.

The goal should be to increase cooperative training among all the combined arms team members and to achieve realistic training that is aimed at a high level of combat proficiency. It should not be just to maintain the capabilities of our respective branches. Now is the time to practice and sharpen the ability of our infantrymen to operate with the combat engineers on any future battlefield and win.

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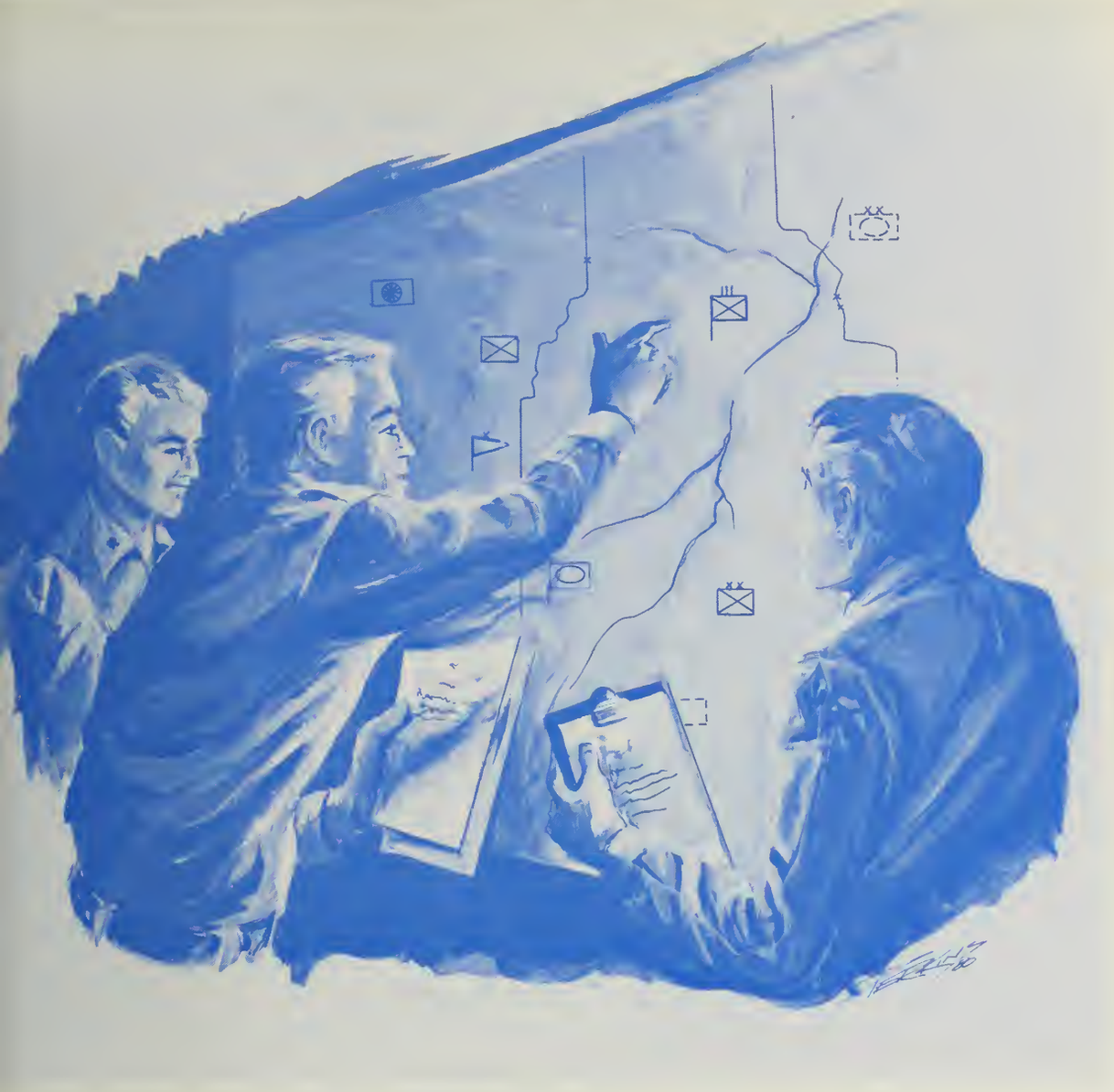


Molding an Effective Tactical Operations Center

by Major John W. Braden, Jr.

Tactical Operations Center (TOC) operations can make or break a battalion. Effective command and control is especially important for engineers, who will often operate throughout a division area of responsibility, attempting to meet requirements greatly in excess of available assets.

continued

One of the first steps in setting up an effective TOC is to determine *who* will be available to staff the operation. For this, reality prevails over the MTOE. Assuming 12-hour shifts within the TOC, a typical S-2/S-3 organization is shown in Figure 1.

Naturally, shifts will be staggered, and a good way to illustrate this is by using a Duty Wheel (Figure 2). Essentially, this is a 24-hour clock which depicts duty times for each position.

The S2 Recon Sergeants are not shifted. Experience has proved that they are best utilized on an on-call basis. The S2 radio and journal are maintained by one of the S2 drivers not out on a reconnaissance mission.

The 12-hour shifts of the S3, Assistant S3, Operations Sergeant, and Assistant Operations Sergeant will always be followed by a 6-hour tour on the road. This means that a key representative from the S3 shop will always be out to observe what is (or is not) happening. After 12 hours in the TOC, this person should have an excellent appreciation of the situation and will be able to provide valuable insights on operations. The 6-hour road tour, after debriefing TOC personnel and the next road tour individual, is followed by a minimum of five hours rest. With this, operations can be sustained almost indefinitely without the "crash" that comes after about 36 hours as TOC personnel become uniformly exhausted.

S3 radio operators, clerks, and drivers also have an additional duty. Two hours prior to, and two hours after, their TOC shift are dedicated to TOC guard duty. Conceivably then, these individuals have eight hours per day off-duty. Considering that their "free" time will be used for eating, sleeping, assisting in moving the TOC and other unplanned housekeeping or operational tasks, this is reasonable.

The Chemical NCO and his counterpart for NBC duties, the Construction NCO, are on 12-hour shifts. During their time in the TOC, they back up the operations personnel and perform special projects as required. When not on TOC duty, they have responsibility for insuring that general housekeeping and maintenance tasks

TYPICAL S-2/S-3 SHIFT PAIRINGS IN TOC

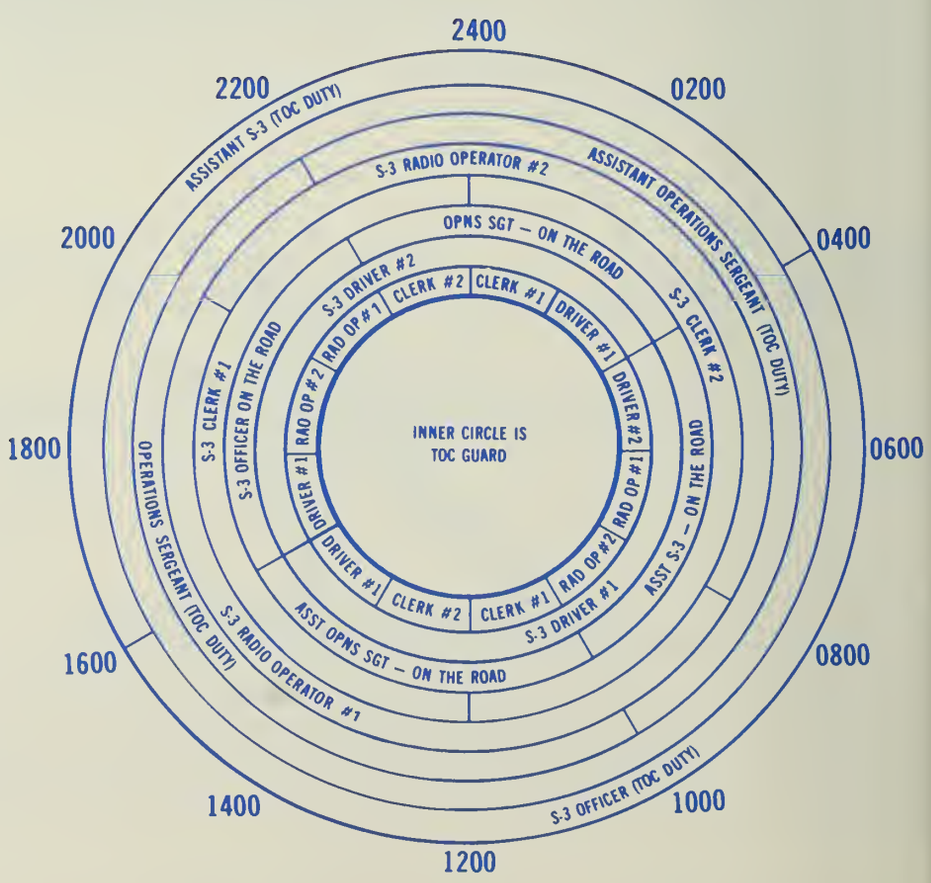
FIRST SHIFT	SECOND SHIFT
S-3 officer	Assistant S-3*
S-2 sergeant	S-2 officer
Assistant Opns sergeant	Operations sergeant
Chemical NCO	Construction NCO**
Draftsman***	Construction specialist***
S-3 clerk	S-3 clerk
S-3 driver	S-3 driver

NOT ON SHIFT
Reconnaissance sergeants (3)
S-2 drivers & clerks (3)

* Battalion NBC officer
** Trained for NBC duties
*** Serves as radio operator

FIGURE 1

FIGURE 2



are performed (often by using clerks, drivers, or radio operators shortly before or shortly after they pull TOC guard). Examples include vehicle and generator maintenance, refueling, and improving positions and camouflage.

During displacements of the TOC, the off-duty NBC NCO has the responsibility of supervising off-duty S2 and S3 personnel to take down and put up the TOC and its ancillary equipment and material. Also, during NBC attacks, the off-duty NBC NCO will travel, if at all possible, to the site of the attack, or incident, and provide NBC defense and decontamination advice to the commander.

In summary, there are four advantages of a Duty Wheel. *First*, it provides a formal system for insuring the capability for sustained operations, as opposed to a peaking of efficiency between six and 12 hours followed by steadily declining effectiveness as TOC members "poop out." *Second*, the system establishes performance norms for everyone. It can be seen that there is an equitable distribution of work and responsibility. No one will feel that he must "gut it out" nor will anyone "get over." *Third*, S3 personnel will be on the road 24 hours per day to insure that missions are being accomplished as visualized and to provide face-to-face contact with units to exchange information and report items of interest directly back to the TOC. And, *fourth*, there is a capacity to provide responsive, on-site assistance directly to units under NBC attack, in order to maintain or regain their combat effectiveness.

Once responsibilities have been delegated, the equipment and supplies required for TOC operations must be identified and preloaded. Naturally, there must be a balance between carrying those items needed for normal contingencies versus overloading the TOC with nice-to-have junk which contributes little and acts like deadweight when it come to moving the operation.

Figure 3 gives a "basic load" of administrative supplies and equipment. It is recommended that CTA-authorized electric typewriters be obtained for garrison use so that manual typewriters may be permanently stored in the TOC vehicle.

Training of TOC personnel can be categorized as equipment training and operational training. The former refers to the labor required to set up, maintain, and break down the TOC plus the training to insure that *all* TOC personnel can operate the equipment (radios, CEOI, vehicles, radiacmeters, generators, Coleman lanterns) essential to the job.

Operational training should begin with Command Post Exercises (CPX). A good battalion level CPX can be set up as illustrated by Figure 4.

In this configuration, a Control is set up which plays both higher headquarters and other units outside the battalion, and also plays each of the platoons and squads in the battalion. The battalion XO can serve as Chief Controller. Other battalion officers such as the S1 and the Maintenance Officer, plus off-duty TOC personnel, can staff the Control Headquarters.

COLEMAN LANTERN PARTS
- Spare mantels
- Spare burner and generator assemblies

TOILET PAPER
SPARE LIGHT BULBS
OFFICE SUPPLIES
- Stapler with extra staples
- Carbon paper
- Manifold paper
- Paper clips, thumb tacks, map tacks
- Correction fluid for typing paper and for mimeograph mats
- Typewriter ribbon and correction tape
- Grease pencils, ink pens, felt tips, pencils
- Alcohol-base (preferred) or water-base pens
- Overlay paper
- Acetate

MAPS
- 1:50,000 map boards
- 1:50,000 road and bridge maps
- 1:50,000 trafficability maps
- 1:250,000 maps

TRASH BAGS
PAPER PLATES AND CUPS, PLASTIC DINNERWARE
COFFEE, SUGAR, AND CREAM
FUEL AND WATER CANS
SPARE PRC-77, BA-30, and AM REMOTE BATTERIES
FLASHLIGHTS
SPARE AM AND FM MICROPHONES
MASKING, CELLOPHANE, ENGINEER (WHITE), AND GENERAL PURPOSE TAPE
ROPE AND STRING
A TOOL SET: WRENCHES, PLIERS, SCREWDRIVERS, HAMMER, NAILS
BLANK FORMS

DD 173	Message pads
DA 1594	DA 2496
DA 1355	A slice of maintenance forms
DA 1355-1	Spot report forms
Range cards	

Recon forms: DA 1248, 1249, 1250, 1251
WD-1 WIRE

FIGURE 3

Figure 4 depicts a closed system. Controllers, acting as higher headquarters, can call a mission into the battalion and expect to respond, as a platoon, to that same mission once it has been analyzed and assigned down from both battalion and company levels. A CPX set up as shown should be run first at a garrison local using land lines for communication. Subsequent exercises can be run strictly by radio.

Operational training must include message handling techniques. An incoming message will normally be received by the radio operator, who will use a DD Form 173 to record the message. Appropriate headquarters will be selected for action. Once the message is no longer required, it is returned to the operations clerk where it is filed, in order, in an envelope attached to the back of the log. There will be a strong tendency for the operators to pull messages out of the normal flow. While this may be required for certain critical traffic, this is often not the case. Since such practice will often result in lost paperwork, all personnel should be cautioned in this regard.

continued

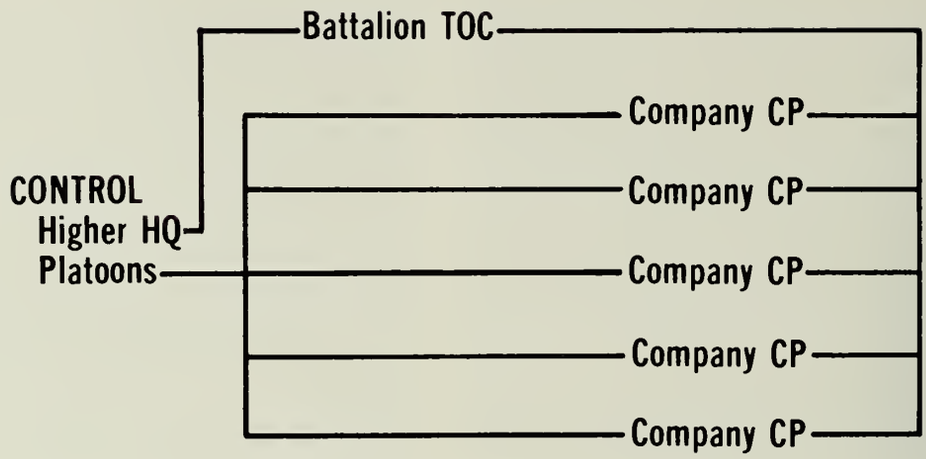


FIGURE 4

The radio operator and the operations clerk will often have to exert a great deal of personal influence to keep the journal straight and messages accounted for.

Since the mechanical effort of drafting or receiving and logging a message is time consuming, it would be wise to overprint a DD Form 173 to meet your needs.

While on the subject of messages, it is a good idea to have a message book readily available to your radio operators and clerks. Normally, this is a 3-ring binder well stocked with appropriate message forms and equally well tabbed. The price for *not* having this or a similar system is that incoming messages get written on scrap paper, C-ration boxes, the walls, or anything else handy.

TC 101-5, Control and Coordination of Division Operations, states that "staff sections maintain the minimum number of information displays required to keep...informed of frequently needed, essential information." At battalion level, besides a situation map maintained by the operations element and the intelligence overlay maintained by the S2 personnel, few other informational displays are needed. Since the contingent of "operations" is small, most extraneous information such as mission-oriented protective posture, weather data, effective downwind message, radiation exposure summaries, personnel and equipment status, and similar information can be maintained on letter size paper in document protectors within a specially designated book.

CEOI callsigns and suffixes are often placed on a chart to aid personnel shifting in and out of the TOC. About the only other informational display which is required is a mission chart.

The mission chart should be an exact blowup of an SOP form which is the Mission Status Report. The form is designed to be included in the Obstacle Annex of a War Plan, though the form is used for more than obstacles, for operating without FM SECURE equipment, and for use in an EW environment where transmission time must be minimized.

Besides listing preplanned missions in an orderly format, the Mission Status Report should be used to assign, in advance, mission numbers to tasks not assigned by the war plan, but highly likely according to the MTOE capabilities of the unit and the commander's best guess as to possible contingencies. These missions can be forecast using the ARTEP as a guide plus a little crystal ball action on the terrain. There is no need to be highly specific in these possible mission assignments since the primary purpose is to provide immediate advance warning to subordinate units so that they may begin appropriate actions while awaiting more definitive instructions.

It should be noted that the reporting requirements for the Mission Status Report can and should be modified for local use. Specifically, there may be neither a need nor a requirement to use all of the columns. This can easily be taken care of by annotating the form. Likewise, not all reports need be transmitted by radio. Data as to the status of non-critical missions can and should be sent by courier.

Once your shifts and operating procedures have been set up and exercised in garrison, you are ready to hit the woods. Begin with an alert and run the CPX discussed earlier from a field location. Note that we're still exercising battalion and company "operators" without wasting the time of our troops.

Natually, if you are going to start with an alert, the first hurdle, other than an effective notification system for all S2 and S3 pesonnel, is to get the TOC operational and up on the net.

This is going to take a little forethought and planning, but shouldn't be too difficult. First, you might think about where your TOC vehicles are normally parked in garrison. Ask yourself if they are in the most advantageous position for immediate operation. For example, instead of the S2 vehicle and S3 vehicle being parked "on line" with the rest of the HHC fleet, maybe they should be routinely backed up to each other in a secure area near battalion headquarters.

Next, put yourself in the position of SP4 Jones, your faithful clerk or radio operator who happens to live in the

barracks and is probably in best shape to quickly set the TOC in motion. There are a few problems, however. Jones needs his mask and weapon, so he stands in line with everyone else waiting for the NBC NCO and the armorer to open up their areas for issue of equipment. Once these have been taken care of, there is the TA 50 to be carried out and the vehicle must be dispatched—so there's more time standing in line. In the meantime, the Battalion Commander, S2, S3, Company Commanders, and a whole lot of other essential people are having a fit because the organization is going without command or control.

How about this instead? At the first word of an alert, Jones, or the first S3 person in, goes to the SDO and draws the extra CEOI issued to the SDO for just such contingency. Then Jones, assuming he's first, goes to the motor pool, performs only those pre-operation checks necessary to safely fire up the vehicle—essentially a check of oil and water—and starts up the TOC to include getting the radios up on the appropriate nets and starting the journal. As TOC personnel arrive, Jones can be spelled to pick up his equipment. Later personnel can get the vehicle dispatched and complete pre-operational checks. (Since Jones didn't move the TOC vehicles, no key would normally be required to simply start the equipment.) An improvement on the system would be to store TOC personnel's TA 50 on the van, truck or trailer in some secure fashion. Same with protective masks.

You can also exercise your ability to handle the various Emergency Action Messages which transition your unit from a peacetime, garrison footing to a fully deployed posture.

Ultimately, you'll move from garrison to the field, normally a local dispersal area. Here's a chance to check out your strip maps and wartime movements procedures.

Once in the field, if you haven't done so earlier, bring in someone to monitor your transmissions and to inject an appropriate amount of jamming and interference to your radio traffic.

Operate for a portion of the time, say in periods up to six hours, in full MOPP.

And one thing you might do after a night or so of operations is to have someone spot check your noise and light discipline. You can figure on a short life span if your TOC is lit like a Christmas tree and sounds like a steel mill.

And, when you think you've got the hang of it, try to maintain operations and communications while moving the TOC an average of six times a day. Frequent moves are a sure way to slim down to nothing but essential equipment.

Displacing the TOC is more than the physical aspect of knocking down, packing up, moving and resetting the equipment. *Continuity of operations* must be maintained. This means that a Jump TOC must be established. Normally, splitting of S2 and S3 vehicles, plus a little fine-tuning of your commo shop retransmission vehicle will do the trick. You'll have to experiment to find out what works best for your operation.

By the way, in order to insure operations continue while moving, have your battalion commander set the move times without notifying anyone, including Control Headquarters, in advance. This can also exercise your ability to select CP locations on short notice. Naturally, you'll want to ask the CEWI types who are monitoring your transmissions if they noted any command and control gaps in your operation while you were shifting locations.

There are a few other things that will make your TOC the epitome of efficiency. Mostly these fall in the category of "helpful hints" that we've all learned the hard way.

Sleep Management. Even using a "duty wheel" such as described earlier, sleep can be a problem—especially in a fast moving environment. There will be a tendency to try to catch a few winks in some of the most uncomfortable positions and places. Personnel should be supervisied to insure within tactical constraints, that they take care of their physical needs by pitching their tent, inflating their air mattress, unrolling their sleeping bag, and laying out fresh clothes. A half hour of setting up a bunk, plus three and a half hours of sleep is far more restful than four, five, or even six hours of "sleep" in the back seat of a jeep (which is unauthorized).

Lights. Since generators tend to go out at the most crucial times, gas lanterns with ample spare parts are a necessity. Vehicular powered lights are adequate in a bind, but they are generally insufficient for sustained operation. A recommendation must be that one lantern should be burning when the generator is working and that two or more lanterns be used at night (to back up each other) when the generator is down. You might note that some units have *only* used lanterns due to noise discipline. (It should go without saying that one of your daytime chores is to fire up all your lanterns to make sure they'll work at night.)

Coffee and chow. It almost goes without saying that the TOC runs on "java," but coffee pots tend to draw Kibitzers and other interested on-lookers. The problem is that all this detracts from the job at hand. Likewise, while the TOC may be a cozy place to eat, this is just something else to take the edge off operations and should be avoided to the extent possible. (It also gets your TOC crew out for a little fresh air every so often.)

You should agree that TOC operations *can* make or break a battalion. Unfortunately, learning to run an effective operations center is like learning to ride a bicycle—you can't do it by reading a book. You have to get out and practice it.

So, good luck to you and your organization, and get out there and *peddle* for all you're worth.

Major John W. Braden, Jr., is an engineer officer currently assigned to the Office of the Inspector General, US Army Training and Doctrine Command, Fort Monroe, VA.

SOMETHING NEW IN BRIDGING

Training on large-capacity, fixed bridges pays off for the 249th Engineer Combat Battalion (Heavy)

by First Lieutenant Dennis E. Linn

The 18th Engineer Brigade, which includes four combat heavy engineer battalions, a topographic battalion, and an engineer construction labor group, is not normally considered a bridging unit. However, one traditional wartime mission for its combat heavy battalions is the maintenance of corps and theater rear area Main Supply Routes.

Current doctrine dictates that German Territorial Commands, in conjunction with the Deutches Bundesbahn (DBB, the German Federal Railway), are responsible for restoring damaged or destroyed rail and high-capacity highway bridges. However, coordination visits to the German Territorial Commands early in 1979 revealed that they stock few semi-permanent or permanent fixed-span bridges.

Another eye-opener was that the German Territorial Commands have few resources of their own. Instead, they rely upon assets drawn from civilian industry. Such dependence is not only risky, but time-consuming in a crisis situation. For instance, it will take a relatively long period of time to convert steel girders and I-Beams to replace a destroyed bridge, *if* the girders and beams are available in the first place.

Therefore, the commanders of the 18th Engineer Brigade and the 249th Engineer Combat Battalion (Heavy) determined following their visits to the German Territorial Commands that expertise in the construction of large-capacity fixed bridges was required.

An analysis of resources available within the theater identified project stocks containing a variety of non-standard bridges.

A site visit to the Reserve Storage Area at Kaiserslautern was arranged to inspect the bridges for suitability and condition. It was discovered that there were a considerable number of bridges and trestles scattered throughout Europe but they had not been used in many years. No one knew if troop units could construct the bridges with organic equipment, if the bridges were truck transportable, or if their design was applicable to modern railway use.

Bridges for training were selected and their release from war reserve stocks was secured from the Department of the Army. The training mission was assigned to B company, 249th Engineer Battalion. Very little was known about the bridges and even the necessary training manuals were difficult to locate. The bridges to be used were the Unit Construction Railway Bridge (TM 5-372 dated 9 November 1943) and the 17-foot and 27-foot I-Beam Railway Bridges (TM 5-371 dated 14 March 1944). In addition, B Company drew a Bailey Bridge Trestle Conversion Kit to use as temporary support during construction. Arrangements were made to borrow ties, rails, and fittings from the DBB to add realism to their training.

The I-Beam bridges were tackled first. Minor variations of these bridges are available in 17, 21, 27, 31, and 35-foot lengths, and are adjustable in one-foot increments by means of a cutting torch. They are deck-type bridges and loading capacities are available up to Cooper's E-45 (or 20 British Standard Units more than enough capacity for any military loading) by using either four or six main girder variations.

The girders are spaced by means of diaphragms and spacers, and reinforced by diagonal bracing on the horizontal plane. This type bridge can be skewed to the left or right and will accept curved track. Bridges can be spliced end to end for longer spans, but must be supported by trestles at their junctures. Trestles may be concrete, timber, or the standard (T type) or light (L type) trestle kits available in war stocks.

The I-Beam bridge is both light and compact for hauling. An entire kit can easily be loaded on a single low bed trailer organic to most engineer battalions. An entire span, less ties and tracks, can be lifted into place using the 25-ton hydraulic crane. The I-Beam's greatest advantage is that it can be assembled in four to five hours, complete with ties and rails, by a relatively inexperienced crew.

The only parts required are I-Beams, spacers, nuts,

and bolts. All bolts are the same diameter and come in just two lengths. Ties are bolted to the I-Beams by means of tie bolts supplied with the kit. Several kits can also be combined to construct trestles according to plans in TM 5-371.

The 249th included the I-Beam bridge in its 1980 training evaluation program (ARTEP) after a minimum of training, and achieved excellent results. During the ARTEP, the 17 and 27-foot bridges were spliced to form a single 44-foot bridge. For the sake of reality, these bridges were placed on steel pile abutments over an expedient trestle from the Bailey conversion kit. Finally, the ties and rails were placed on the bridge, proving that the I-Beam bridge can be constructed in a reasonable time period under simulated combat conditions.

The I-Beam bridge is portable, flexible, easily constructed, and is currently in the European inventory in quantity—97 bridges of various lengths are currently stocked in Germany. These bridges, although old, have been well maintained and provide an inexpensive resource for maintaining our supply routes.

B Company began training on the Unit Construction Railway Bridge (UCRR) shortly after the battalion ARTEP. It is designed as a through-type bridge utilizing trusses for structural strength. It is constructed in sections, based on chord lengths of 15 and 20 feet, allowing spans from 55 to 85 feet in five-foot increments. Load bearing strength of the UCRR is also Cooper's E-45. It can be skewed left or right by five feet (the length of one bay). The bridge is considerably more complex than the I-beam bridge, but is well designed for ease of construction. Major bridge components are the truss, made of a top and bottom chord with verticle and diagonal webs, and the floor, made of heavy floor beams and light stringers, and stiffened by means of diagonal bracing on the horizontal plane. All bridge components are fastened using a combination of bolts and short drift pins, and rails are fastened directly to the floor beams without ties. Fewer bolts are used than pins. Pins are used at major stress points, on the principle that bolts fasten parts to one another, while pins, which must be driven into their holes, provide shear strength across the joints. This combination increases the strength of the bridge and at the same time cuts down considerably on the time necessary to construct it. Longer bridges can be built by combining kits and using intermediate trestles. The trestles may be concrete, lumber, or steel. Standard (T type) or light (L type) trestle kits may also be used.

The Unit Construction Railway Bridge is considerably heavier than the I-Beam type. Its weight exceeds 1100 pounds per linear foot of finished bridge, and chords and floor beams weigh over 2000 pounds each. It is, however, easy to transport. A complete bridge kit, capable of building an 85-foot span, is easily loaded on three lowbed trailers and two five-ton dump trucks.

The UCRR was designed to be built on an existing railway with a launching nose. It should be launched across the gap on dollies and lowered into place. However, B Company concluded that the best means of construction using assets of the combat heavy company is to prefabricate the bridge in chord length sections on flat land near the gap and lift them into place on temporary supports of Bailey Bridge trestle or other suitable material. This method of construction is compatible with most uses of the bridge. It also provides an increased work force because crews and sites can be duplicated for each chord section. It also reduces by half the amount of material which must be hauled by eliminating the need for the launching nose. The Unit Construction Railway Bridge is stocked at several locations in Germany, with a combined stockage of 35 kits.

Troops assemble unit construction railway bridge.

Aside from the railroad application of these bridges, both the I-beam and Unit Construction bridges can easily be modified for expedient highway use. The I-Beam bridge can be widened with additional spreaders and by decking it to suit the intended class of vehicle. The Unit Construction Bridge may also be used as a highway bridge, but its normal configuration limits vehicular width. The bridge has a clearance between trusses of 10 feet-4 inches, while the width of an M60 tank is 10 feet-6 inches. However, the bridge can be built in an inverted position and decked over, providing an overall width of 14 feet-8 inches. Two-way traffic can be handled by addition of a floor section and one truss, providing a three-truss bridge with an overall width of 27 feet-2 inches. The deck design provides the load limit for either the one or two-lane bridge.

The I-beam and Unit Construction Railway Bridges are permanent, heavy capacity bridges. The fact that they are both easily transportable and easy to construct means that they can be adapted to a wide range of uses. The German Territorial Commands and the DBB may be capable of maintaining rail beds and bridges under combat conditions, but the 249th Engineer Combat Battalion (Heavy) now stands ready to assist them in keeping open vital supply lifelines.

Lieutenant Dennis E. Linn is currently attending the Engineer Officer Advanced Course at the US Army Engineer School, Fort Belvoir, VA. He was formerly assigned as the construction officer for B Company, 249th Engineer Battalion (Combat), Karlsruhe, Germany.

The Engineer Museum

"Resolved, that there be one Chief Engineer at the Grand Army, and that his pay be $60 per month. That two assistants be employed under him, and that the pay of them be $20 per month....."

The Continental Congress
June 16, 1775

Text by Mary Vitek

Photos by Specialist Four Jim Eady

The original art of a World War II recruiting poster.

More than two centuries of military engineering, beginning with the legislative proclamation above, are preserved and displayed within the US Army Engineer Museum at Fort Belvoir, VA, home of the US Army Engineer Center and School. The museum's historical collections and artifacts reflect the Army engineer story and depict our nation's progress in times of peace and war.

Perhaps the most priceless artifact on display in the museum is an original map rendering in detail the siege of Yorktown, VA, during the Revolutionary War. British forces at Yorktown surrendered to the American and French troops on October 19, 1781, ending the war and assuring our country's independence.

Although the Continental Army Corps of Engineers disbanded after the Revolutionary War, engineers were still needed to construct fortifications. Therefore, between 1807 and 1812, military engineers designed and built 24 forts and 32 coastal batteries. Several years later, in 1839, a turreted castle was officially approved as the symbol and insignia of the Corps of Engineers. Exhibited in the museum is the original drawing of the castle approved by Chief of Engineers Major General Joseph G. Totten. The original insignia was initially worn on the uniform belt, but later on the cap and epaulatte. It has remained the symbol of the Corps to this day.

Museum photographs and diagrams illustrate various construction projects completed by the Corps during the 19th century. Among them is the Washington Monument, completed in 1885. Colonel Thomas L. Casey of the Corps of Engineers supervised construction of the monument and later supervised construction of the Library of Congress (1896) and the State, War, Navy Building (1888).

Among other remarkable Corps of Engineers achievements recorded

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The Corps of Engineers "castle" first appeared on the hilt of a nineteenth century Army rapier which is part of a collection of miscellaneous accessories and uniforms displayed throughout the museum.

by the Engineer Museum is the salvage of the Battleship "Maine." The Maine sank in Havana Harbor in 1898, following a mysterious explosion. Fourteen years later (1912), the Corps raised her, towed her out to sea, and gave her a fitting burial. The raising of the Maine has been described as "an engineering task without precedent, frowned upon at the start by many prominent engineers, but now considered by the most skeptical....an unqualified success." The Maine began her last voyage at 2 p.m. on March 16,1912. Three miles and 41 minutes later, the 324-foot battleship was submerged again, this time at 600 fathoms. To document the engineering achievement, the ship's wheel, a cable section, hatch lock, lamp and photographs are on display in the museum.

The oldest artifact on display is a Greek ring dated at approximately 350 B.C. The face of the gold ring bears a resemblence to Alexander the Great.

More than 400 Army engineer insignia are also displayed. The collection includes: the 405th Engineer Battalion's insignia, upon which is inscribed "The camels are coming;" the 391st Engineer Battalion's insignia with the inscription "Y'all come;" and the 203rd Engineer Battalion's insignia, inscribed with "Don't kick our dog."

Other Army engineer memorabilia includes uniforms, posters, personal items, portraits, firearms, and furniture.

Today, the US Army Corps of Engineers is the world's largest engineering organization. It serves the Army and our country in the tradition which began more than 205 years ago. The US Army Engineer Museum conveys the proud tradition of the Corps in a colorful and interesting format.

Mary Vitek is a former Army journalist and staff writer for ENGINEER Magazine.

Ship's wheel of the battleship Maine, salvaged in 1902.

Field Manual 100-5 prescribes four basic tasks for the covering force.

*Force the enemy to reveal the strength, location, and general direction of his main attack. To do this, the covering force must strip away enemy reconnaissance and advanced guard elements, establish contact with the enemy main body, and fight with sufficient intensity to make the enemy prematurely deploy maneuver and fire support units and begin his main attack.

*Deceive the enemy, or prevent him from determining the strength, dispositions, and locations of friendly forces in the main battle area.

*Divest the enemy of his air defense umbrella, or force him to displace his air defenses before attacking the main battle area.

*Gain time for the main battle area force, enabling it to deploy, move, or prepare defenses.

The employment of an armored cavalry regiment in covering force operations is doctrinally routine. Numerous service schools and staff college exercises incorporate this mission since cavalry is generally considered superior to other units for the covering force mission. Their special training, superior communications capability, integral air units, and high density of surveillance equipment particularly suit them for such a role. Cavalry will probably fight the first battle of the next war. Nevertheless, the employment of an armored cavalry regiment in the classical covering force role on a free-play maneuver exercise had not been attempted for at least a decade prior to CERTAIN SENTINEL/REFORGER '79.

During that exercise, the 2d Armored Cavalry Regi-

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Combat Engineers Up Front

by Lieutenant Colonel Gerald C. Brown

The covering force battle is a key to the active defense. Success in those operations demand the skillful utilization of all elements of the combined arms team. Today, more than ever before, combat engineers play an indispensable role. The January 1979 REFORGER exercise CERTAIN SENTINEL provided a unique opportunity to evaluate forward combat engineer support on a battlefield where terrain reinforcement was the focus of the tactical plan. Every aspect of the engineer's role was scrutinized under rugged winter conditions, during a scenario as demanding as peacetime conditions permit. This article describes that experience and major lessons learned.

ment (2 ACR), reinforced by the 4-73d Armor Battalion, 17th Field Artillery Group, and the 82d Engineer Battalion (Corps, Combat), was employed on a covering force operation forward of a deploying reinforced mechanized infantry division. The Covering Force Area (CFA) was established in the Steigerwald Forest along the Main River plain bounded by a simulated international boundary. The terrain was a low mountainous forested area interspersed with river obstacles, but still affording several high speed avenues of approach into the covering force area. The sector stretched 93 kilometers wide with an average depth of 26 kilometers.

For over two days and two nights the regiment and its supporting units covered the sector against the ORANGE attack of a reinforced armored division. Effective terrain reinforcement was the cornerstone of the operation's success, clearly demonstrating the feasibility of covering force operations outlined in FM 100-5.

The problems resulting from a 93-kilometer front are difficult to imagine. REFORGER '79 stretched the capabilities of the 82d Engineer Battalion and the OPCON 84th Engineer Company from the 2 ACR to the maximum. But combat engineer operations across vast expanses are the norm today in the European environment. Therefore, the lessons learned by combat engineers on the Army's only recent experience in full scale covering force operations can hardly be overstated.

Supporting the same maneuver unit they had worked with on several previous exercises afforded the 82d Engineers an important edge in planning and executing their varied missions. They knew the commanders, their style of fighting, and the particulars of their weapons systems, enabling them to anticipate tactical requirements for obstacles. The battalion was ready from the day it was designated as direct support to the 2 ACR.

To the Regimental Commander of the 2d Armored Cavalry, combat engineers were the key to his active defense. His concept of operations hinged on the covering force's ability to:

"...structure the battlefield through obstacles and fires to halt the enemy for the purpose of conducting combat operations on the enemy's flanks and rear where the ratio of combat power is in our favor and battlefield victory can be achieved."

Linear obstacles to stop or canalize tank formations were paramount in stopping the enemy. However, those obstacles had to be supported by carefully chosen and fully coordinated gaps and lanes, which permitted counterattacks to defeat enemy advanced elements and develope the situation.

The 82d Engineer Battalion developed the obstacle portion of the draft operations plan. It was initially prepared using map analysis. A detailed reconnaissance then followed, conducted down to the platoon leader level. Positions were selected for weapon systems to cover obstacles. Exact ranges and dead space were determined. And counterattack lanes were selected by the supporting engineers and tactical commanders. The regimental plan was subsequently refined, and the final operations plan was published. The next step was a tactical rehearsal without troops, directed by the regimental commander. Engineers participated down to squad leader level, using that period to verify communications, prepare target folders, and practice target turnover procedures.

The even distribution of engineer effort across the battlefield, or perfunctory weighting of engineer support to favor the most dangerous avenue of approach, is wasteful of combat power. Engineers should be concentrated on terrain with lucrative terrain reinforcement potential. During this exercise, engineers concentrated their effort in the river valleys south of Bamberg and in the Steigerwald. The plains to the west, where the lack of defensible terrain would have required several battalions to produce significant results, received light engineer support.
The western open expanses afforded great opportunities for counterattack against the exposed flanks of the attacking enemy, especially using aerial antitank systems. The regimental commander appreciated the fact that once the battle is joined, overwatching maneuver units can be rapidly shifted to counter opposing threats while precious engineer effort invested to structure the battlefield cannot be relocated. His analysis proved accurate in the subsequent battle.

There were four avenues of approach into the covering force area. In the west, the open terrain north of Wuerzburg afforded a rapid approach to the FEBA and turned the flank of the riverline defense along the border. However, this approach was bounded on three sides by the Main River. It would have required a deliberate river crossing into the FEBA. This avenue was dubbed Bowling Alley West and was lightly defended by one reinforced cavalry troop supported by two platoons of engineers. The engineer missions were to destroy several major bridges over the Main River and disable the four-lane Kassel autobahn. Mobile Assault Bridging from MBA forces was planned to recover friendly forces withdrawing back across the Main.

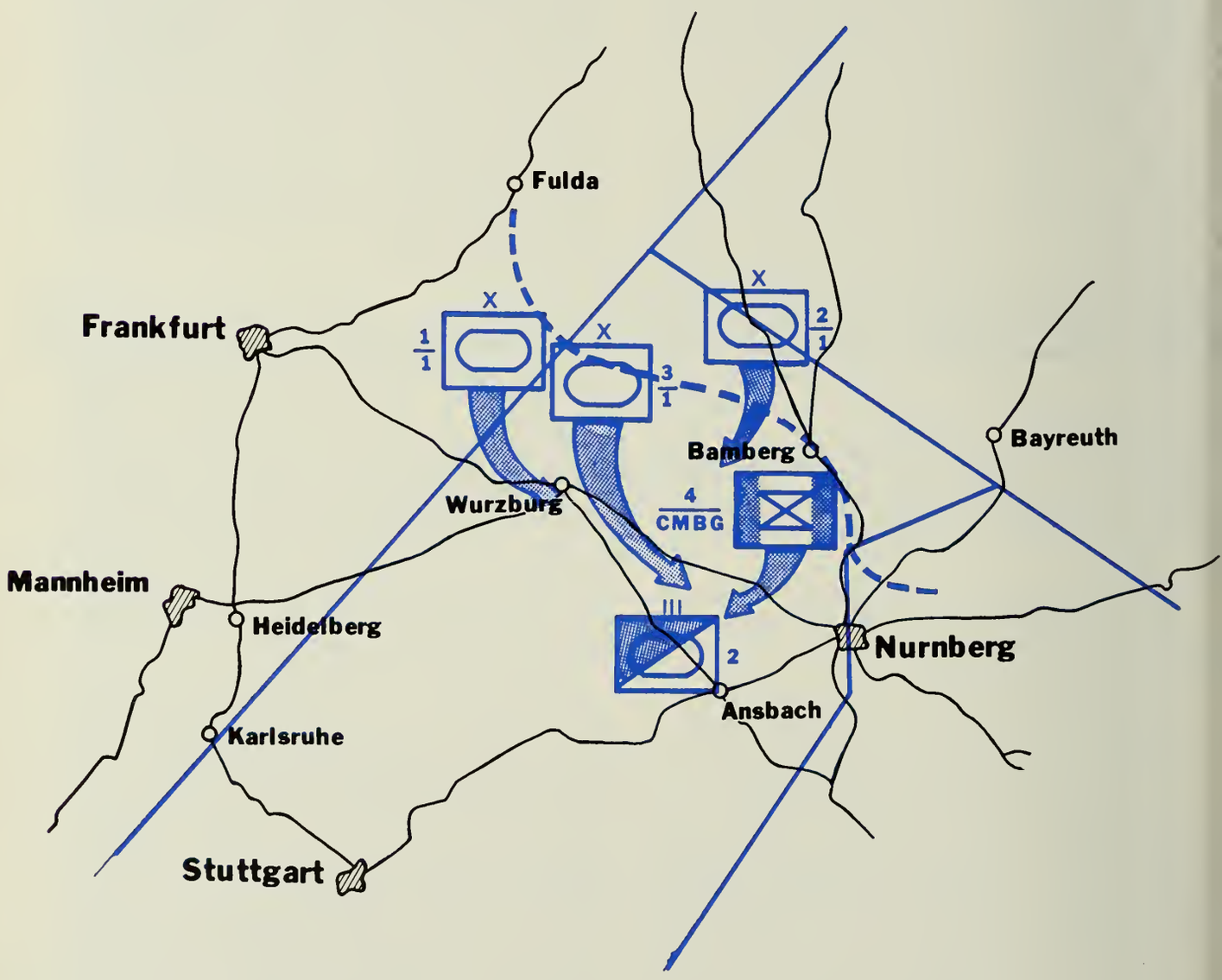
The plain between the Main River and the escarpment of the Steigerwald, given the sobriquet "Bowling Alley East," offered a second high-speed approach to the FEBA. In this sector, the enemy could conduct a river crossing along the simulated international boundary against light resistance due to restrictions along the simulated politically sensitive border. However, mediocre crossing sites complicated this advantage. In addition, the natural terminus to this avenue of approach was a wide choke point near Schwanberg Mountain, with further advance to the south difficult. The evident vulnerability of an attacking force to air and ground counterattack permitted it to be lightly screened. The four engineer platoons utilized on this avenue of approach prepared the bridges for destruction and prepared that battlefield for a highly mobile defense.

The Steigerwald approach between Eltman and Bamberg offered good river crossing sites that were covered and concealed. It also offered a good armor approach onto the MBA. The dominating ridgeline south of the river was too close to the simulated international

continued

boundary to organize a strong defense against a deliberate river crossing. The main disadvantage of this avenue was the cross-compartmentalized terrain in the CFA, which facilitated terrain reinforcement. This area was defended by TF 4-73 Armor, a balanced task force of two mechanized infantry companies and two armor companies, supported by three combat engineer platoons.

The Valley Complex between Bamberg and the east boundary was the most dangerous avenue of approach. It provided the shortest route to the FEBA, running down a series of ridges and valleys and was easily entered by crossing the fordable Regnitz River. ORANGE Force success in this area would endanger operations in the Steigerwald and allow premature penetration of the FEBA. Drawbacks to this approach were the difficulty in lateral movement created by forested ridges and tributaries to the Regnitz. The regimental commander directed top priority of engineer support to this area,



where the first battle could be quickly lost. Eight combat engineer platoons were employed to structure the battlefield for defense by one squadron of cavalry. The regimental commander counted on a defense based on engineer obstacles to make this avenue impassable.

The regiment's broad concept of the operation was to economize on the relatively invulnerable left flank, weight the right flank heavily with engineers to block enemy penetrations, and to concentrate forces on the two center avenues of approach. One cavalry squadron plus a tank company was held in regimental reserve. Initial positioning of the maneuver forces and preparations by the 82d Engineers were designed to support the two most likely contingencies: a fast, fluid attack across the plain of Bowling Alley East, or a slow, methodical delay through the Steigerwald.

The bridges across the Main River between Schweinfurt and Bamberg, and across the Regnitz River from Bamberg to the right boundary posed a dilemma for the covering force commander and his engineers. These rivers constituted the simulated international boundary across 80 percent of the front. Political restrictions similar to those along the actual Communist border in Germany prohibited fires across the boundary until after formal declaration of hostilities. Forbidden were preemptive spoiling operations and overflights into enemy territory for either air strike or reconnaissance.

When combat begins along an inviolate international border, the enemy will enjoy a tremendous initial advantage of political and tactical initiative. Capture of a bridge intact will provide the enemy with an even greater tactical advantage. Therefore, all 31 bridges over the Main and Regnitz Rivers in the covering force area had to be destroyed, regardless of their size. The covering force commander was placed in the unenviable position of either starting the war by blowing the bridges too early or losing it by blowing them too late. Detailed planning went into their destruction, including redundant firing systems and multiple communications means.

Senior personnel headed each firing party, whether executed by engineers or cavalry. With instructions to destroy the bridges on order, or to prevent capture, problems developed. Spirited troops eager for action faced each other across narrow expanses of water. Small arms and machine gun harassing fires were directed against the defenders at several sites. Some firing party commanders considered their positions in danger and destroyed their bridges prematurely. Their decisions, made under fire, were difficult to explain to senior commanders who had issued clear orders that ORANGE must intiate the battle.

Terrain reinforcement requires time. During CERTAIN SENTINEL, the 82d Engineer Battalion prepared obstacle plans, assuming 48 hours would be available for around-the-clock work, before the onset of hostilities. Generally, combat engineers are among the very first to deploy. The effectiveness of the defense depends to a large degree on the time available for preparation, which in turn depends upon the political release of alert measures to permit preparation of the battlefield. NATO war plans give priority to the covering force area, where specific targets have been authorized by the German government for earlier emplacement.

But under the tactical scenario for CERTAIN SENTINEL, obstacle work was not permitted until the attack was imminent. Fortunately, targets on the bottom of the list were not emplaced. Tactical commanders sought optimum effort from their engineers by having them work to the rear of the line of contact, preparing positions for turnover as they fell back. This concept worked well where supporting engineers were thoroughly familiar with their supported unit.

The alert measures for REFORGER 79 represented a short notice from Warsaw Pact Forces that NATO allies must be prepared to counter. Political restrictions can be expected to result in the release of alert identifiers in a careful and deliberate manner. Precious little time may be available to structure the battlefield effectively and to provide time for the MBA force to deploy and prepare. The combat engineer family desperately needs improved equipment and methods to increase responsiveness on the huge, dynamic European battlefield. Needed now are the M-9 Universal Engineer Tractor, the M-180 Cratering Device, and Scatterable Mine Systems, all in various stages of development and testing or procurement.

Target turnover was not a problem with 2d Armored Cavalry Regiment units because of normal association and joint training. All targets turned over were non-electrically fired. Detonating cord for each circuit of the dual-primed systems terminated at a small stake on the friendly side of the obstacle. A sand bag placed on each stake contained two sections of time fuse with cap and fuse lighter, necessary tape, and illustrated instructions. These methods had been incorporated into the SOPs of both the cavalry and engineers. Target turnovers to the attached armor units were much less successful, however.

CERTAIN SENTINEL clearly demonstrated the need for the mechanization of engineers supporting the covering force. The 84th Engineer Company, organic to the regiment, was generally more effective than the wheeled Corps engineer units because of superior mobility, additional firepower, and greater survivability. The 82d Engineers were not always able to keep up with supported cavalry elements, especially when maneuvering cross-country over snow and ice covered terrain. Operating near the line of contact and despersed over a wide area with heavily outnumbered friendly forces to their front, covering force engineers needed the additional firepower provided by mechanized fighting vehicles.

Communications were a major problem. A Corps engineer battalion needs a higher density of communications equipment for the covering force mission. Communication during CERTAIN SENTINEL was dependent upon carefully selected FM sites for command posts and relays to net across the vast area. AM afforded some backup, but was unreliable. RATT was able to stay in contact with the engineer higher headquarters, the 7th Engineer Brigade.

continued

The ORANGE attack was well executed. At 8:00 p.m. on January 29, a series of demonstrations were conducted along the simulated international boundary and continued until 11:00 p.m. At 8:25 p.m., TF 4-73 Armor responded to border incursions by destroying two bridges. At 9:50 p.m., the regimental commander ordered all remaining bridges blown immediately. All bridges were down by 10:00 p.m.

The enemy launched two strong supporting attacks on the flank avenues of approach on January 30. In Bowling Alley West, the light screening force withdrew under the attack of an enemy brigade. Two troops from 3d Squadron, 2 ACR, crossed one of the unblown bridges and attacked the rear of the enemy brigade with excellent results until called off by an umpire who was confused about the status of the bridge they had crossed. Friendly troops were then withdrawn from Bowling Alley West, which was successfully covered by air cavalry. In the Valley Complex, the 4th Canadian Mechanized Brigade attacked but was skillfully handled by the 2d Squadron, 2 ACR, thanks to the priority of engineer effort placed in that sector.

ORANGE Forces infantry crossed the Main River at Eltman, and surprised and destroyed A/1-16 Infantry at 3:00 a.m., January 30. The 3d Squadron in reserve deployed one cavalry troop to a blocking position behind that sector. Minor build-ups continued during the day, and by early evening, bridging was reported at Eltman and Bischberg. Pressured by intense artillery and rocket fires, friendly artillery had withdrawn and could no longer range to the bridge sites. Lance missiles were fired on enemy engineers at the crossings, slowing their efforts. Counterattacks to destroy bridges under construction were unsuccessful. Early on the morning of January 31, major elements began crossing into the Steigerwald. The cross-compartment terrain reinforced by engineers and covered by outnumbered cavalry, greatly slowed the ORANGE attack to the south.

The enemy again demonstrated near Hassfurt on January 31, but did not cross. By early afternoon on that date, all ORANGE units south of the Main had been identified. The regimental commander briefed the MBA commander and key VII Corps staff personnel on enemy dispositions and the direction of the main attack. No longer hamstrung by political restrictions, the regimental commander proposed a major counterattack to seize the initiative. His recommendation was denied, primarily due to administrative requirements of exercise control and deteriorating weather conditions. The covering force was orderd to break contact and begin withdrawal at 5:00 p.m. on 31 January.

The experience of the 84th Engineer Company and the 82d Engineer Battalion during CERTAIN SENTINEL/ REFORGER 79 demonstrated that engineers can reinforce the terrain for the covering force battle over a vast, dynamic and lethal battlefield. It also revealed major problems of aging equipment and outdated methods. Lessons learned are difficult to visualize by personnel responsible for designing equipment or developing doctrine. In an era when field exercises on the scale of CERTAIN SENTINEL are all too few those lessons should be embraced throughout the engineer family for training, and improvement of our equipment and doctrine.

Engineers must also communicate these lessons to tactical commanders, who must employ combat engineers more effectively with the combined arms team. Their full support is vital for the procurement of new equipment and for the development of new doctrine to improve engineer responsiveness on future battlefields.

Lieutenant Colonel Gerald C. Brown is currently a student of the Army War College in Carlisle Barracks, PA. When he wrote the article above, he was assigned as the commander of the 82nd Engineer Battalion, 7th Engineer Brigade. His unit was in direct support of the 2nd Armored Cavalry Regiment (the BLUE covering force) during FTX CERTAIN SENTINEL.

ENGINEER PROBLEM

The Brigade Commander has directed you, the Brigade Engineer, to emplace an antitank minefield from coordinate UT042835 to coordinate UT045831, with a depth of 250 meters. No antipersonnel mines are required. The commander has specified that the probability of tank kills should be at least 70 percent. Your company is equipped with an M57 Antitank Mine Dispensing System that is available for use.

Three tasks must be completed in order to accomplish the mission:

1. Compute the required antitank mine density to produce a 70 percent kill probability.
2. Determine the total number of mines required and the number of mine rows.
3. Determine the required number of platoon hours to emplace the minefield and the required number of five-ton dump trucks to transport the mines.

See THE SCHOOL SOLUTION, page 40

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Engineer Preparation of a Position

by Colonel F. Palaguta

During the years of the Great Patriotic War, intelligent use was made by service personnel of the protective features of terrain and various field defensive structures in order to successfully execute assigned missions and reduce casualties. This enabled us to maintain the capacity to fight back even after strong artillery attacks and bombing raids and beat off superior enemy forces.

In his book of reminiscences, "Malaya Zemlya" (Small Earth), Leonid Il'ich Brezhnev writes: "The question might arise as to how it was possible for people to survive after having been plastered by hundreds of tons of lethal metal by an ememy force greatly exceeding our own?" And the answer to that is that "all this was opposed by experience, presence of mind, cold calculations, and routine daily work....scores of kilometers of communications passages, thousands of riflemen pits, trenches, and foxholes were dug."

Front line experience testifies that the intelligent concealment of firing weapons and personnel along with other factors predetermined the success of battle in the final analysis. An antitank gun located in a position prepared by engineers and properly camouflaged usually destroyed two or three enemy tanks, but if it was in an exposed position, it could fire only one or two rounds and destroy at best but a single tank.

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Given the constant improvements made in missiles and conventional means of attack, the role of troop protection and, therefore, engineer preparation of a position, is dramatically increasing. A simple calculation will show that the more simple structures, such as trenches, ditches, communication passages, and slit trenches can reduce losses to personnel from the shock wave of a nuclear blast by a factor of 1.5 to 2.0, reduce the flow of penetrating radiation, and provide protection against light radiation.

In the opinion of foreign specialists, the neutron weapon greatly complicates the solution of the problem of protecting personnel on the battlefield. Here, protective works are deemed more effective than armored vehicles.

The new developments in infantry, artillery, and other types of weapons and military equipment call for changes in the forms of protective structures, especially trenches and shelters. The principle of erecting such structures remains the same—to insure the most effective use of tank, artillery, and motorized rifle elements in warfare, their maneuver, and provide the necessary protection against all manner of attack means. Additionally, another element is required in the engineer preparation of a position, which, in modern times, is one of the decisive factors, and that is speed in setting up the protective works. Toward that end, it is necessary to work persistently to perfect engineer troop training and more fully utilize mechanized equipment and explosive charges which will reduce the time for preparing a position.

continued

Unfortunately, during the course of tactical instruction of subunits, only limited tasks in engineer preparation of a position are performed. In such subunits, the troops have acquired no skills in digging trenches or ditches, to say nothing about constructing equipment dugouts and shelters, and the like. We sometimes had occasion to observe a situation wherein after a few rounds from an artillery piece it was necessary to strengthen improperly prepared works that were intended for prolonged use. We still get reports about individual officers, especially among the younger men, who point out that they can prepare a position which will meet all regulations when that will be required in a real battle situation. However, experience shows that ability and practical skills do not come of themselves, but are acquired through persistent effort. It is necessary to improve and consolidate them continually.

As we know, in order that a unit occupying a certain area in the field be in a state of constant combat readiness, its personnel and equipment should be positioned beforehand in structures built according to a certain definite sequence.

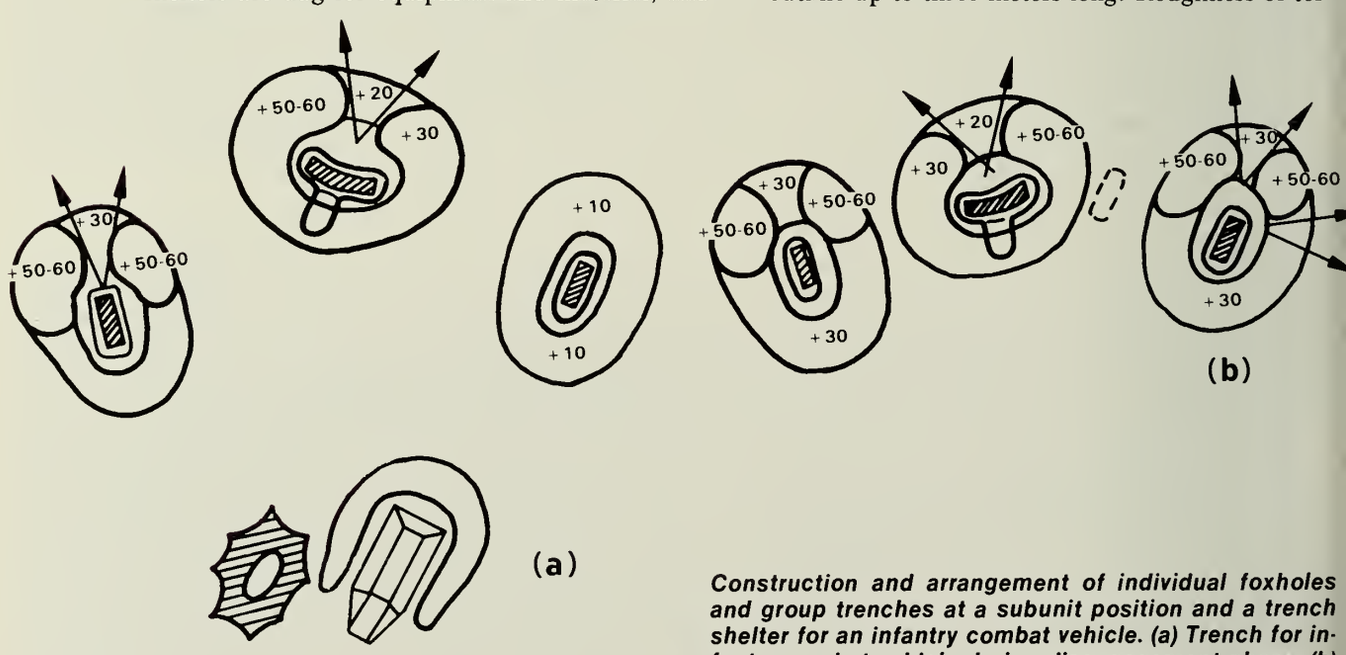
First, foxholes, pits for all firing weapons, slit trenches for personnel, and the basic structures for control posts and for providing first aid to the wounded are dug, and obstacles constructed forward of the main line of defense on the flanks.

Second, trenches are dug for the subunit, reserve pits for weapons, and structures are further fitted out for staff officers and medical aid centers; covered slit trenches and dugouts are prepared, shelters are dug for equipment and material, and obstacles reinforced. Sections of roads and the man-made structures on them are prepared for demolition and routes are prepared for maneuver.

Later on, the protective works are improved upon, their protective features augmented, areas of deployment of the second echelons and antitank reserves prepared, and the necessary trenches and shelters in areas earmarked for the reserves at the alternative and dummy positions, etc., constructed.

All measures are carried out with strict observance of camouflage discipline. Engineer preparation of a position usually begins with digging in. First, foxholes are dug for fire from prone positions, which are 60 centimeters wide, 170 centimeters long, and 30 centimeters deep. For convenience in conducting fire, a support is constructed 10 centimeters higher than the bottom of the pit for resting the elbows. This threshold is 25 to 30 centimeters wide. The earth or snow is thrown forward when forming a breastwork 30 centimeters high, the sloping side facing the enemy. The foxhole for use in fire from prone position provides primary protection against rifle and machinegun fire and shell splinters. Gradually deepening the trench, the trooper adapts it first for fire from a kneeling position and from a standing position. In these cases, the depths dug are, respectively, 60 and 110 centimeters, and the height of the breastwork is increased to 50 or 60 centimeters.

In addition to the one-man trenches, two-man and occasionally three-man trenches are built in the form of slit trenches of rectilinear or broken outline up to three meters long. Roughness of ter-



Construction and arrangement of individual foxholes and group trenches at a subunit position and a trench shelter for an infantry combat vehicle. (a) Trench for infantry combat vehicle during disengagement phase. (b) Trench for two riflemen.

FIGURE 1

rain greatly facilitates laying out the trenches. However, here it is inadvisable to locate one's position near individual bushes, mounds, or boulders readily visible to the enemy, because they might be used as reference points for registration fire. In all cases, the trenches should be carefully camouflaged in keeping with the surrounding terrain background, using materials readily available and special camouflaging, weaving in bunches of grass and tree branches.

The time required for troops to dig a foxhole of the single man type in class 1 and 2 soils is: for prone fire, not over 30 minutes; fire from kneeling position, up to 1.2 hours; and for fire from standing position, up to 1.5 hours. The time required for digging a two-man trench is 1.5 to two times greater.

The position for fire with machinegun consists of two slit trenches disposed at a slight angle with an area of 100 by 100 centimeters. The breastwork is constructed on three sides with a height of 50-60 centimeters, and in the arc of fire, it should be up to 20 centimeters high. About 2.5 hours is required to dig this type of trench.

Time permitting, single foxholes are connected together into trenches for a squad, and these are subsequently formed into trenches both for conducting fire and observation, and for movement along the front. As a result, the troopers have an opportunity to establish contact with one another during the course of the battle, a fact which has a very positive effect on their psychological state. Former front line fighters know how important this is in a combat situation. In his book, "Soldier's Duty," Marshal of the Soviet Union K.K. Rokossovskiy cites such an example. He writes, "Our manuals in force before the outbreak of the war taught us to build our defenses based on the so-called 'yacheyechnaya," or small trench system. But alas! The war taught us something different. Upon reaching one of the small trenches I relieved the soldier sitting there and remained alone. As an old soldier who had taken part in many battles I frankly confess that I felt awfully bad in that nest. During the entire time I had the desire to jump out and see if my comrades were sitting in their nests or whether they had abandoned them and left me alone. And if the sense of alarm did not leave me, what must it have been like in the case of a man who, possibly, was in combat for the first time. People will always be people and, naturally, one wants to have a buddy by his side. In addition, one wants the commander to be near, especially during periods of danger.

The author continues: "Everyone decided it was necessary to get into the trenches immediately. On that day all units were given appropriate instructions....Everything was accomplished easily and efficiently. And the defense became stronger." Subsequently, regardless of the type of action it became a fixed rule to: stop, dig in, and, if time permits, improve your positions.

The outlines of the trenches and communication passages should be curvilinear, broken and with recesses, depending on the method of digging and the terrain relief. In order to reduce casualties to

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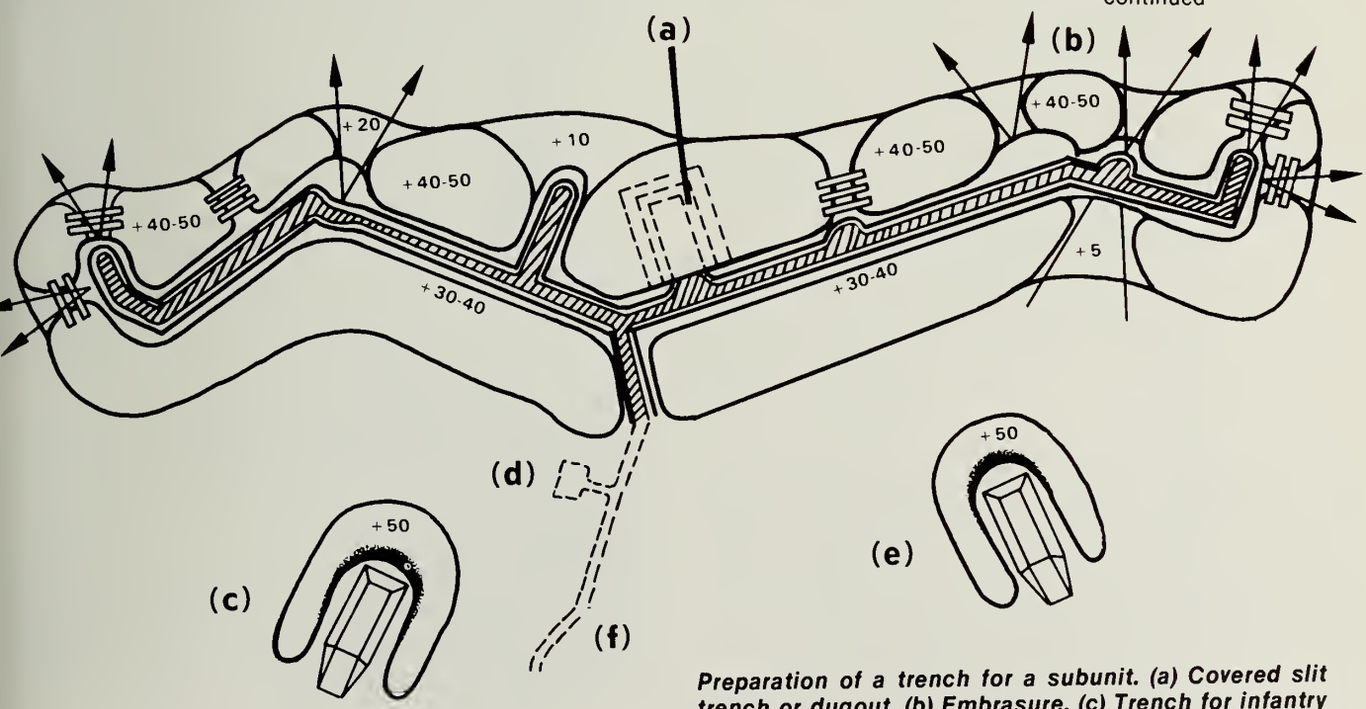

Preparation of a trench for a subunit. (a) Covered slit trench or dugout. (b) Embrasure. (c) Trench for infantry combat vehicle at main firing position. (d) Latrine. (e) Trench for infantry combat vehicle at reserve fire position. (f) Possible communications trench.

FIGURE 2

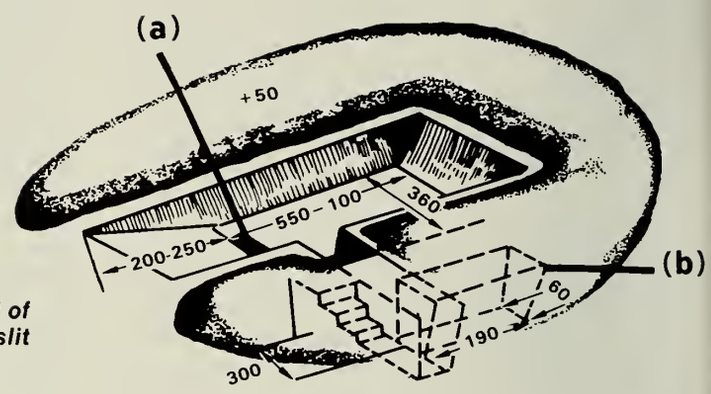

FIGURE 3

Trench for infantry combat vehicle with circular field of fire. (a) Water collecting sump. (b) Shell slit (covered slit trench).

personnel by the shock wave and splinters, the rectilinear portions are made 15-20 meters long at angles of 120 to 160 degrees to one another. Covered portions of trenches and overhead protection above embrasures with earth cover over 10 cm thick protect troops against incendiary mixtures such as napalm, radioactive substances and droplet gases, and are used as often as possible. The construction of trenches and communication passages is accelerated considerably if mechanical equipment is used. For example, the PZM (regimental excavating machine) type equipment in ten hours of operation can replace 200 men digging for ten hours in medium type soil. However, protective works of this kind should be finished off manually.

In addition, combat conditions generally restrict the use of engineer machinery to the areas of the first and second trenches. Accordingly, each trooper must know how to dig and prepare trenches and other of the more simple shelters manually, especially in hard ground, using various devices and explosives.

Armored equipment per se is a reliable shelter but trenches for tanks, infantry combat vehicles, (armored carriers) and artillery greatly improve protection for teams, crews, and equipment against the effects of modern attack means. Such trenches consist of an area for conducting fire, shelters for the crew or team, ramps, and breastworks. Depending on the mission assigned, the conditions of the terrain, and time available, trenches for tanks are constructed by the crews themselves with the aid of multipurpose bulldozer equipment (BTU) both with a limited sector of fire (60°-120°) and with a circular sector of fire. Trenches for infantry combat vehicles are prepared in the same manner.

Artillerymen additionally excavate ammunition recesses. In all cases, the service equipment should be well camouflaged with standard means of makeshift materials. Since various kinds of vegetation is often used for this purpose, one should bear in mind that cut grass and branches of the leafy species change color and the spectral characteristic in several days, whereas the evergreen varieties preserve their color longer—up to 15 days in the summer and over a month in the winter. Reeds, sedges, and moss do not lose their properties for from 10 to 15 days. Branches of such deciduous species as oak, birch, basswood, and maple are considered the better camouflaging materials. Branches of aspen and alder turn brown in 24 hours. In the winter, snow and flaky ice formed by spattered water make the best camouflaging materials.

An important factor in engineer preparation of the terrain when constructing trenches, foxholes for riflemen, machinegun emplacements, as well as shelters is the coordinated construction of protective structures and camouflaging activities. Therein lies the guarantee of success in conducting combat operations.

Secrecy in work activities is achieved by making maximum use of the dark period of the day, the camouflaging properties of the terrain, and weather conditions. All structures dug during the night should be carefully camouflaged before the arrival of morning light. Remnants of building materials, various types of containers, and the like should be cleaned up and tracks of vehicles in the soil should be eliminated.

The following sequence should be adhered to in constructing trenches: select an area, clear the terrain and the field of view and the fire sector, dig foundation area and ramps, prepare ammunition pits and shelters for personnel, and camouflage area.

In the process, the team, crew, and subunit should at all times be prepared to go into action.

INTEROPERABILITY

—more than just a word

by Major Laurence R. Sadoff

The goal of USAREUR's Project Partnership is to strengthen our NATO forces through mutual training and social interaction. The 9th Engineer Combat Battalion (Corps) and the German Pionierbattalion 12 demonstrated the effectiveness of the program during 1979.

Soldiers of the Pionierbataillon 12 cross US floating footbridge.

Every soldier who has served in Europe during the last 13 years is familiar with the USAREUR Project PARTNERSHIP Program designed to facilitate interoperability training among NATO allies. Through such training, soldiers of allied nations develop confidence in and understanding of each other's tactics and procedures. They learn about each other's equipment, weapon systems, munitions and logistics. They learn about each other's culture and heritage, about what motivates and inspires both the individual soldier and his nation.

During 1979, the 9th Engineer Battalion (US) and the Pionierbattalion 12 (GE) were recognized for their outstanding PARTNERSHIP affiliation. Many successful joint training exercises and professional development activities have resulted from their affiliation—activities which have helped develop a unified peacetime deterrent force.

JOINT TRAINING

The foundation of the PARTNERSHIP Program and INTEROPERABILITY training between these two battalions has been team and unit training. Some of that training is described below.

Exercise Harter Amboss (Solid Anvil) was a joint battalion training exercise conducted 5-10 April 1979 and hosted by the PiBtl 12. Included was a two-day MAPEX and a two-day joint CPX/FTX. Participants included representatives from the Panzerpionierkompanie 140, Panzerpionierkompanie 350, Panzerpionierkompanie 360, 9th

continued

Troops load test a Bundeswehr pneumatic float bridge constructed by personnel of Pionierbataillon 12 and D Company, 9th Engineer Battalion on the Danau River.

Engineer Battalion, 565th Engineer Battalion and Pionierbataillon 12 (PiBtl 12). Participants analyzed and discussed various problems that might arise if US and Bundeswehr units were in support of, under operational control of, or attached to each other during combat operations.

During the joint CPX/FTX, each unit set up a Tactical Operations Center (TOC) in a school house. The exercise commenced when an OPORD (IAW NATO STANAG 2014) was issued to both headquarters. The order, issued in German, directed each battalion to conduct reconnaissance and plan munitions for a series of preselected obstacles.

From their reconnaissance, an estimate was made of the amount and types of munitions that were needed for the obstacles. After this information was passed to higher headquarters, another OPORD, also issued in German, directed the battalions to estimate the time and manpower to emplace the obstacles and report certain information. The 9th Engineer Battalion, since it was in an FTX mode, actually emplaced the obstacles, assisted by Wallmeisters from VBK 64. Target turnover was also practiced.

The 1979 exercise was considered an overwhelming success and led to MAPEX HARTER AMBOSS II, hosted by the 9th Engineer Battalion in April 1980. The format remained the same as 1979. Salient topics discussed and analyzed included:

(1) Support of ADM operations
(2) Conduct of river crossing operations
(3) Development of realistic resupply rates
(4) Various methods of command and control under engineer task force organizations.

Every American soldier is familiar with the Army Training and Evaluation Program (ARTEP). It was designed to fill a significant void in training guidance to the field. Units can use the ARTEP to train and evaluate themselves and to diagnose their strengths and weaknesses through dynamic performance-oriented training.

During 1979, the PiBtl 12 participated with 9th Engineer Battalion units in both squad and platoon ARTEPs. Only previous operational commitments prohibited their participation in a formal company ARTEP.

During these evaluations, US standards, tasks, and conditions were used to evaluate two Bundeswehr squads and one platoon.

In June 1979, soldiers of Company D, 9th Engineer Battalion and PiBtl 12 participated in a joint river crossing exercise across the Danube (Donau) River, the second swiftest river in Europe. During the first portion of the exercise, known as EINING AM DONAU BRIDGE TRAINING, soldiers from Company D trained with Bundeswehr pneumatic float bridging equipment. They learned about the various rafting configurations, and about German river crossing doctrine and tactics. Training was also accomplished on the French Mobile Assault Bridge. The culmination of the exercise was a complicated and sophisticated link-up of an eight-raft section, 132-meter bridge across a quickly rising Danube River. The link-up was remarkable because it involved rafts constructed and controlled by both US and Bundeswehr soldiers and was conducted as the Danube began to flood.

Flooding was so great that all bridging had to cease. During the training lull, units conducted essential interoperability training in target turnover. Interpreters were purposely not provided. Soldiers were forced to communicate using their inherent skills.

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The collective training during CPX/FTX HARTER AMBOSS, ARTEP training, and Eining ım Donau Bridge Training was instrumental in resolving differences in doctrine, tactics, terminology, organization, command and control, ınd logistics.

PROFESSIONAL DEVELOPMENT

In addition to continued participation in major joint training, both units conducted special professional development training to demonstrate their respective doctrine, tactics, terminology, organization, command and control, and logistics. Let us examine some examples of this training.

In January 1979, the 9th Engineer Battalion gave an antitank ditching demonstration for personnel of the PiBt1 12 and selected cadre of maneuver units they support. Another such demonstration was conducted in January 1980. The importance of these demonstrations cannot be over-emphasized. Antitank ditching is an integral part of US doctrine and defensive planning. While US maneuver commanders are aware of their capabilities and routinely include them in their barrier operations, many senior Bundeswehr maneuver commanders remain skeptical about the effectiveness of antitank ditches. They question the ditching effectiveness and data on the rate of construction and labor required. But through demonstrations, Bundeswehr maneuver commanders are able to observe the merits of antitank ditches and are starting to adopt them as part of their mobility and countermobility plans.

Does the individual soldier, NCO, and officer know the tactics, doctrine, and weapons systems of his allied counterpart? Commanders of the 9th Engineer Battalion and Pionierbataillon 12 realize the importance of grass roots training and have initiated extensive individual training programs between battalions.

In March 1979, a combined team from the 9th Engineer Battalion provided detailed instruction to the cadre of the PiBt1 12 on US munitions and explosives. The Bundeswehr soldiers learned how to use the M-57 mine dispensing system, US mine detectors, antihandling devices, antipersonnel mines, antitank mines, cratering charges, demolition kits, and minefield recording forms. Later, officers for PiBt1 12 instructed the cadre of the 9th Engineer Battalion on Bundeswehr munitions and explosives. US soldiers became proficient in the use of the Panzermine DM 11 (antitank mine), Schutzensplittermine DM 31 (antipersonnel splinter mine), Schutzendruckmine DM 11 (antipersonnel blast mine), Sprengkorper DM 11A1, DM 21A1, DM 12 (100g, 200g, 1000g explosive charges and 500g plastic explosive), Sprengschnur DM 11 (det cord), and Zundschnur DM 11 (time fuze). Dynamic hands-on training was emphasized rather than standard classroom presentations.

PARTNERSHIP—A MARRIAGE OF UNITS

A PARTNERSHIP between units is much like a marriage. Both parties must work hard to make it successful. An unsuccessful partnership is agonizing for both parties.

The partnership activities between units are the result of detailed, careful planning. In December 1979, the S3s of both battalions met and discussed their planned activities for 1979. They reviewed each other's plans. PARTNERSHIP training was not developed to simply entertain, but to involve each other in mutual unit training.

Besides joint training, specific individual professional development programs were planned to enhance mutual understanding. The S-3s of each battalion met each quarter to review previous training and activities, and to coordinate specific training for future months. This procedure produced no less than 38 PARTNERSHIP activities in 1979 and the process has continued throughout 1980.

PARTNERSHIP training is conducted so that soldiers of each unit can fight alongside each other using the other's weapon systems, if necessary. Through high-quality joint training, many differences in doctrine, tactics, terminology, organization, command and control, and logistics have been resolved. Detailed instruction is provided on each's weapon systems and munitions. Officer and NCO professionalism courses have been conducted on a mutual basis and each has participated in the other's high-quality unit training on a regular basis.

Volleyball competition between US and Bundeswehr soldiers.

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German recovery vehicle is stymied by an antitank ditch constructed by personnel of the 9th Engineer Battalion for a demonstration at the Hohenfels Training Area.

Involvement in training and social activities at all levels is encouraged. The result may be a Schutze participating in 9th Engineer Battalion Organization Day activities; a Specialist Four playing in a 12 PiBtl volleyball tournament; a Gruppe or Zug participating in an ARTEP; or a US officer participating in Advantessen.

The PARTNERSHIP Program is based on a long term arrangement that requires effort from both parties if it is to succeed. Perhaps the strongest testimonial to the lasting relationship between the 9th Brigade and 12 PiBtl is the distance separating them—160 kilometers by autobahn. Despite the driving time (nearly four hours), the PARTNERSHIP units engaged in 38 activities in 1979, as mentioned.

The accrued benefits of a successful PARTNERSHIP include mutual understanding, increased awareness of social and cultural differences, and greater knowledge of each other's doctrine, tactics, terminology, organization, command and control, and logistics. A successful PARTNERSHIP increases the strength of our NATO forces, which must be prepared for any contingency. Interoperability is, indeed, more than just a word.

Major Laurence R. Sadoff is currently attending the Naval War College in Newport, R.I. He formerly served as the S-3 of the 9th Engineer Battalion.

RESERVE COMPONENTS

'ARTNERSHIP PROGRAM

Division and brigade-sized combat nits of the Army National Guard and he Army Reserve will soon train with ac-ive Army "partner" units.

The new AC/RC Partnership Pro-ram, initiated by the US Army Forces Command (FORSCOM), will pair the najor infantry and armor units of the Guard and Reserve with similar active Army units for training support, evalua-ion and assistance. Partnership differs rom earlier active component training upport programs in two ways. First, it is planned as a long-term relationship. Se-ond, partnership will be expanded beginning in FY 81 to provide year-round AC support for RC training.

In comparison, the two programs be-ng replaced by partnership, the Active Component Support to Annual Training (ACSAT) and the AT evaluation pro-grams, were operated only during the RC unit's two-week AT period and the AC/RC unit alignments changed each year.

Partnership complements on-going programs, such as the Affiliation Pro-gram and the Army Capstone Program.

The partnership program relationships were developed based on several factors, including geographic proximity of units, likeness and compatibility of skills and equipment, AC unit's capabilities to pro-vide training support, previous relation-ships (ACSAT, etc.), and Capstone methodology.

PX PRIVILEGES DOUBLED

Army exchange privileges for members of the Army National Guard and the Army Reserve have been doubled. Members now earn one day of PX privileges for each four-hour drill. That means four days of PX privileges for a two-day drill weekend, instead of only two.

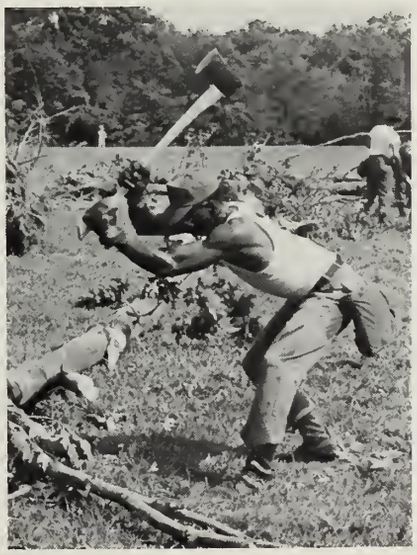
Dependents of Reserve Component members may use the PX, but they must be accompanied by their sponsor. Unit members must present their red Reserve Component identification card and Leave and Earning Statement when us-ing the PX. Only Reserve Component unit members may use the PX privileges; individual Ready Reserve members are not eligible.

RAFT BUILDING CHAMPIONS

Army Reservists of the 652nd Engineer Company (Float Bridge) work against the clock during the annual M4T6 Five Float Reinforced Raft Building Competition at Fort Leonard Wood, MO. The Ellsworth, WI, unit shaved three minutes from the old record which it established last year to become the 1980 champion with a time of 68 minutes. Finishing second with a time of 71 minutes was Company E, 632nd Engineer Bat-talion, Minnesota National Guard, Hutchinson, MN. Other participating units included Company A, 5th Engineer Battalion, Fort Leonard Wood, MO; the 522nd Engineer Company, Fort Knox, KY; and the 224th Engineer Battalion, Iowa National Guard, Burlington, IA. (US Army photo by SFC Ron McCumber).

TRAINING EXERCISE

A soldier with B Company, 469th Engineer Combat Battalion (Heavy) out of Fort Dix, NJ, is hard at work (at right)trimming trees removed as the bat-talion builds a new parking lot in Mon-mouth County Park System's Turkey Swamp Park, Freehold, NJ, as part of a weekend military construction training exercise. Dump trucks, supply trucks, bulldozers, a front end loader, a grader, jeeps and various other vehicles lined an open field as members of B Company participated in this Army Reserve train-ing exercise. Other units included A Company and HQ Company from Caven Point, NJ, and C Company from Nor-thfield, NJ. Campers and other park visitors were invited to watch and ask questions and learn about the Army Reserve and how it functions.



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CIVILIAN SCHOOLING

Army sponsored graduate education is restricted to those disciplines in which the Army Educational Requirements Board has validated requirements and a "shortage" of qualified officers exists. Currently, these disciplines, for engineer officers, include the following:

Civil Engineering
Aeronautical Engineering
Chemical Engineering
Engineering Physics
ORSA Engineering
ADPS Engineering
Nuclear Effects Engineering
General Engineering
Electronics Engineering
Geodetic Science
Nuclear Physics
Oceanography, Hydrology

These shortage disciplines also support a second specialty in addition to Specialty 21, Engineer. Graduate school opportunities during FY 81 are anticipated to be at approximately 55-65 officers depending on requirements and officers availability.

Fully funded advanced degree training (AR 621-1, Chapter 4) is the principal program for obtaining a graduate degree and provides the primary means to train officers at the masters level. Application is made by forwarding DA Form 1618-R. An officer's application is automatically considered each time he becomes available for reassignment. The primary zone for consideration for schooling is five to 14 years service. The program is very competitive and requires an outstanding overall record of performance.

The degree completion program for graduate degrees is covered by Chapter 8, AR 621-1. It allows up to 18 months at an accredited university to complete a masters degree in one of the aforementioned disciplines. This program varies from the fully funded program in that tuition cost must be defrayed by the student. All participants are schooled in a shortage discipline for which an AERB position exists and serve in a follow-on utilization assignment.

Officers must possess the following qualifications in order to be considered competitive for selection:

- Performance ratings must be among the top one-third among their contemporaries;
- They must have successfully completed the Advanced Course;
- They must have successfully completed a company command tour;
- They must have completed two tours with preference to those that have been overseas.

The maximum period of undergraduate training under the degree completion program that can be supported is 18 months. The objective is to support those officers with outstanding performance records in obtaining a bachelors degree in disciplines that the Army can use. The disciplines are too numerous to list here, but undergraduate education directed in the areas where graduate level shortages exist receive preferential consideration.

SPECIALTY DESIGNATORS

The Officer Personnel Management Directorate has initiated file reviews to determine second specialty qualifications of all OPMD-managed officers in Year Group 1974. Some of the factors being considered include time served in various specialty areas, performance ratings in these specialty assignments, civilian and military education, and individual preferences.

The final determination of second specialties, formally designated for all officers completing eight years of active service, is based on the following criteria: Army needs, individual experience, and personal preferences. Army requirements must be the primary consideration in making final designations.

Year Group 74 officers have had, or soon will have, an opportunity to cite second specialty preferences on personal questionnaires which OPMD furnished through servicing Military Personnel Offices (MILPOs) during November 1980. Questionnaires returned to OPMD are compared with the results of the file reviews before OPMD makes a final designation for each officer in YG 74.

The specialty designation process is more complex than most officers realize. The least complicated situation occurs when the company grade officer cites specialty preferences which correlate with his education, training, and experience. If there is little or no correlation, OPMD must evaluate the officer's experience and preferences and make a judgement decision based on both Army requirements and individual preferences.

If an officer's preferences are not supported by experience, the OPMD evaluator must also judge the officer's potential to complete the necessary training, and whether Army requirements could be filled better by other captains with similar specialty preferences who already have the required training and experience.

OPMD career managers may have to designate some officers from YG 74 into OPMS specialties in which Army requirements exceed the number of officers who prefer those specialties. But OPMD's goal is to minimize the number of captains who are designated specialties which they do not list as preferences.

STAFF SCHOOLS REVAMPED

Studies/programs are underway to revamp our military schooling for company grade officers. The new programs reflect some of the recommendations contained in the Review of Education and Training of Officers (RETO) study.

Under RETO, the Army will establish a Combined Arms and Services Staff School (termed "CAS-cubed" or CAS^3) at Fort Leavenworth, KS, this fiscal year. When the system become fully operational in FY 85, all officers can expect to attend the new school sometime during their seventh to ninth year of service. This means that more than 3,300 officers will be enrolled in CAS^3 each year. The school will include both resident and nonresident instruction.

After an officer has completed the nonresident phase, he will attend the resident phase during his seventh, eighth or ninth year of service. All officers will be required to participate in the program.

The resident phase of the course is tentatively scheduled to span nine weeks. Students will attend the resident phase in

a TDY status. As an outgrowth of the CAS[3] program, the Army has had to develop a new system for selecting officers to attend resident command and staff college level schools. Beginning with academic year 1982-83, a year group method will be used to select officers for CSC. Under the new system, officers will be eligible for CSC consideration during their eighth through eleventh years of commissioned service and will compete with officers from their own year group for selection.

During the transition period to the new CSC system (until 1983), the Army will continue to give CSC consideration to officers with eight through 15 years of service. During 1982 and 1983, the selection of officers with 12-15 years of service will be influenced by how many officers from those year groups already have attended CSC. Year-group competition for officers with eight through 11 years of service will begin in 1982. The new CSC system should be fully operational by 1985.

COMBINED ARMS COURSES

To perpetuate the combined arms atmosphere at the Infantry and Armor advanced course, one engineer officer will be selected to attend each course. Only the most qualified officers will be selected to represent the engineers and participate in these school courses.

PHOTOGRAPHS

What does your photograph in your Military Personnel File say about you? Are you well dressed? Does your uniform fit? Are you represented as an officer who is ready for added challenges? Your official photograph should represent you at your very best. Don't wear "special" items such as jump boots, unauthorzied tabs, ribbons, berets, etc., when having your photo taken. And avoid wearing photo-sensitive glasses which tend to look like sunglasses when placed on microfiche. If your latest photo is outdated, or if you appear overweight, it may be doing you an injustice. Remember that AR 640-30 requires a new photo of every officer every three years.

PHYSICAL EXAMS

Army Regulation 40-501 requires physical exams for every officer at four-year intervals up to age 39, at two-year intervals from age 39 through age 48, and annually beginning at age 49. Officers should make sure that their correct height and weight measurements are reflected on their Officer Record Briefs (ORB), particularly those who have experienced a recent weight gain or loss. Local Military Personnel Officers should post the ORB based on a physical exam or height-weight certificate from local medical activities.

HOMEBASE ASSIGNMENTS

Officers desiring to return to their current installation following a dependent restricted overseas short tour must apply through their installation commander to Commander, MILPERCEN. Installation comments will be considered by MILPERCEN in programming homebase assignments. This procedure does not delegate veto authority on homebase assignments to installation commanders. Final authority is retained by the commander of MILPERCEN.

Requests must be submitted in writing to arrive at MILPERCEN (appropriate assignment division) no later than 30 days after initial notification for the overseas assignment. If the request is not received within 30 days after initial notification, an advanced assignment will be projected based on Army requirements, individual professional development needs, and personal desires.

OPMD REORGANIZATION

A plan for the reorganization of MILPERCEN's Officer Personnel Management Directorate (OPMD) was approved during Fall 1979. The reorganization, scheduled to take place over a 19-month period, is designed to provide efficient and effective "life cycle" career management for Army officers under the Officer Personnel Management System (OPMS).

The reorganization plan calls for three vertically structured career management divisions: Combat Arms Division, Combat Support Arms Division, and Combat Service Support Division. These divisions will be responsible for assignment of lieutenants through lieutenant colonels. The Colonels Division and Warrant Officers Division will be retained without change. The Majors Division was disbanded in August 1980 and integrated into the Combat Support Arms Division. The Lieutenant Colonels Division is scheduled to be disbanded and integrated by the end of February 1981.

Under the new structure, an officer's career will be managed by one of the three career divisions from the day he enters the Army as a second lieutenant through selection for promotion to colonel. This not only improves total management but also gives officers a single point of contact throughout their careers from grade 0-1 to grade 0-5.

Officers who hold entry specialties 11, 12, 13, 14, or 15 will be managed by the Combat Arms Division. The Combat Support Arms Division will manage those officers with entry specialties 21, 25, 27, 31, 35, 36, 37, 72, 74. The Combat Service Support Division will manage officers with entry specialties 42, 43, 44, 71, 73, 75, 76, 77, 81, 82, 87, 88. and 92.

"ONE STOP" RECORDS SERVICE

Officers visiting MILPERCEN to review their Official Military Personnel File are now also provided assistance to update their Officer Record Briefs (ORBs). The new service is part of MILPERCEN's effort to provide "One-Stop" personnel records service for officers visiting the personnel center in Alexandria, VA.

To insure that ORB information is accurate, officers should communicate first with their local MILPO to update the information and not wait until they visit MILPERCEN.

ENLISTED CAREER INFO

ARMY APPRENTICESHIP PROGRAM

Engineer soldiers have the opportunity to earn civilian credit for their military job by participating in the Army Apprenticeship Program. The program directly relates MOS skills to civilian skills.

To be eligible, engineers must have as a primary or secondary MOS one of the specialties approved for the program, and must be working in that MOS.

Most programs require 6,000 or 8,000 hours of documented work. However, previous work experience and training can account for up to half of the total required hours. Not all soldiers participating in the Army Apprenticeship Program are guaranteed an apprenticeship completion certificate. All criteria must be met. Since a soldier is required to perform some duties in an MOS not related to the apprenticeship requirements, and since the Army is not always able to provide the needed tasks, some hours of qualifying work experience may have to be completed when the soldier leaves the Army.

Soldiers leaving the Army before completing the program can obtain letters from their local education services officer (ESO) to certify their documented work experience.

For each approved program there is a pamphlet in the DA PAM 621 series to explain the requirements. Engineer soldiers who are interested in the program should contact their local ESO who will help them fill out a short application. The Army service school sponsoring the particular program decides how much credit a soldier should get for previous training and work experience.

The approved occupational programs draw soldiers from more than 130 MOS, all of which are open to women. So far, the programs with the most participants are wheeled vehicle mechanic, grading and paving equipment operator, helicopter mechanic, and cook. Approximately 16,000 soldiers are currently participating in the program, but an estimated 100,000 more soldiers could participate.

PROGRAMS AVAILABLE FOR ENGINEER SOLDIERS

OCCUPATION	MOS	DA PAM 621-
Plant Equipment Operator	62G/H	76
Grading & Paving Equip Operator	62E/H/J	77
Heavy Duty Repairer (Const Equip)	62B	78
Universal Equipment Operator (Constr Equip)	62F	79
Carpenter	51B	84
Plumber, Pipefitter	51N	85
Electrician	51R	86
Firefighter	51M	116
Refrigeration/Air Conditioning Repairer/Servicer	52C	115
Lithographer (Offset Press Operator)	41K, 83E/F	112
Drafter (Architectural)	81B	113
Industrial Electrician/Repairer	52E	117
Powerhouse Electrician/Repairer	52E	118
Rigger	12B/C 51C/H	123
Surveyor, Engineering	82B/D	107

NCO DEVELOPMENT PROGRAM

The Army Chief of Staff has approved the establishment of an Army-wide NCO Development Program (NCODP). The objective of the program is to increase combat effectiveness of the Total Army by strengthening the NCO Corps in the following areas: leadership; professional skill development; training; counseling; care of the soldier; and military conduct and discipline.

The NCODP will be a unit commander's program, conducted primarily under noncommissioned officers when appropriate. It is at the unit level where potential noncommissioned officers are selected, where their most significant training is accomplished, and where their performance counts most in the Army's mission. Therefore, commanders will be responsible for creating, implementing, and guiding noncommissioned officer development programs within their units and organizations based on individual requirements and available resources.

The NCODP will contain training tasks, duties and responsibilities which enhance unit combat readiness. The unit NCODP will be supported by an HQDA program which will develop initiatives to strengthen those Army-wide programs providing support to the NCODP such as EPMS, Army Training Literature Program, Army Continuing Education Program, and the Quality of Life Program.

To assist commanders in NCODP development and execution, each major command will establish a Noncommissioned Officer Development Advisory Council chaired by the command sergeant major. Members will include senior noncommissioned officers from the command. The Sergeant Major of the Army has been charged with overall responsibility for the program.

COMMANDERS AWARD PROMOTION POINTS

Unit commanders now have more to say about who gets promoted to E-5. Commanders will award up to 150 points based on the soldier's knowledge of and ability to perform assigned duties, dependability, attitude, initiative, conduct, physical condition, and potential to perform at the next higher grade.

Previously, up to 150 points on the 1,000-point worksheet were awarded based on Enlisted Evaluation Report weighted averages. Enlisted Evaluation Reports are no longer required for E-4s.

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Commanders will have to submit a DA Form 4187 (Personnel Action) awarding the points at the time that the soldier is recommended for promotion. They can change the score awarded a soldier by submitting another DA Form 4187.

ASSIGNMENT IN RESERVE COMPONENTS

Active Army soldiers are being assigned full time to high priority Reserve Component units to enhance their readiness. Their presence in troop units is expected to ensure daily attention to key areas of readiness. These areas include administration, supply, maintenance, and training activities.

The reassignment of Active Army soldiers to Reserve Component units is one of the Army's highest priority personnel objectives. It involves the cooperative efforts of both the losing and gaining organizations to select qualified soldiers.

Before being selected, each individual has to be checked against the high standards associated with Reserve Component duty. These standards are specified in AR 614-200, Enlisted Personnel Selection, Training and Assignment System: Grades E-1 through E-9.

SOCAD COURSES

The Army has added 21 new associate degree programs to those already offered through the Servicemen's Opportunity Colleges Associate Degree (SOCAD) Program. New courses include: Law Enforcement; Aviation Maintenance; Communications Electronics; Accounting; Automotive Maintenance; Civil Engineering; Communications (Media); Computer Maintenance; Construction; Data Processing; Diesel Maintenance; Office Management; Security Services; Correctional Services; Transportation; Electrical Power; Digital Electronics; Food Service Management; Instrumentation; Management Science; and Medical Records.

Each of the 21 new curricula is in a technical field related to certain MOS and career management fields. In each program a soldier may be awarded credit for technical skills achieved through military service.

More than 300 colleges participate in the SOCAD program, and soldiers may transfer credit easily from one participating school to another. More than 70 of the schools offer a management program geared to combat arms soldiers.

SELECTIVE SERVICE REGISTRATION

Military personnel on active duty are not required to register for selective service. However, males born in 1960 or 1961 who were on active duty at the time registration started and are later separated, are required to register within 30 days of their separation. These individuals should go to their local post office and fill out a registration form. Beginning January 1, 1981, males born in 1962 will register, and there will be continuous registration for 18 years olds. Male personnel separated from active duty after the period specified for their registration must register within 30 days of their separation.

OFFICER PROCUREMENT

Qualified soldiers are encouraged to apply for either Warrant Officer School or Officer Candidate School.

To be eligible for acceptance to Warrant Officer School, soldiers must be between the ages of 18 and 46, and have sufficient education, technical training and practical experience to perform prescribed duties in the MOS requested. Other requirements include a minimum GT score of 110, good moral character, good leadership qualities as demonstrated by personal background and previous experience, and a favorable security screening.

Enlisted personnel and warrant officers on active duty wishing to apply for the 14-week Officer Candidate School, now called Branch Immaterial Officer Candidate Course (BIOCC), must be between the ages of 19 and a half and 29 at time of enrollment. However, a waiver of age may be granted by Commander, US Army MILPERCEN. In addition, applicants must have completed two years of a four-year college degree program. Male personnel must have a minimum GT score of 110 and a composite score of at least 200 between the Officer Candidate Test (OCT) and the Officer Qualification Inventory (OQI). Female personnel must have a minimum GT score of 115. The OCT and the OQI are not required for females. Individuals must have a Class A physical which should be accomplished no earlier than six months prior to the date of application, a score of at least 300 points on a PT test taken no earlier than two months before the date of the board, and a favorable security screening. Soldiers currently serving overseas will not be able to PCS to CONUS until completing 24 months of a long tour. Short tour assignments of less than 24 months will be completed before PCS.

Class dates and cutoff dates for submission of applications for BIOCC have been scheduled as follows:

CLASS NO.	REPORTING DATE	GRADUATION DATE	CUTOFF DATE
3-81	April 19, 1981	July 28, 1981	January 16, 1981
4-81	June 14, 1981	September 22, 1981	March 13, 1981
5-81	August 2, 1981	November 10, 1981	May 7, 1981

THE SCHOOL SOLUTION

I. MINEFIELD DENSITY

From Figure M-2, FM 20-32 (below right), the required minefield density is determined to be .8 mines per meter of front.

II. TOTAL MINES REQUIRED

Compute the total number of mines required by multiplying the minefield density by the minefield width and add a 10 percent safety factor (mine rejections, strip length variance, etc.). The minefield width is the distance between the minefield coordinates, which you determine to be approximately 500 meters.

Width x Density + .10 (Width x Density) = mines required

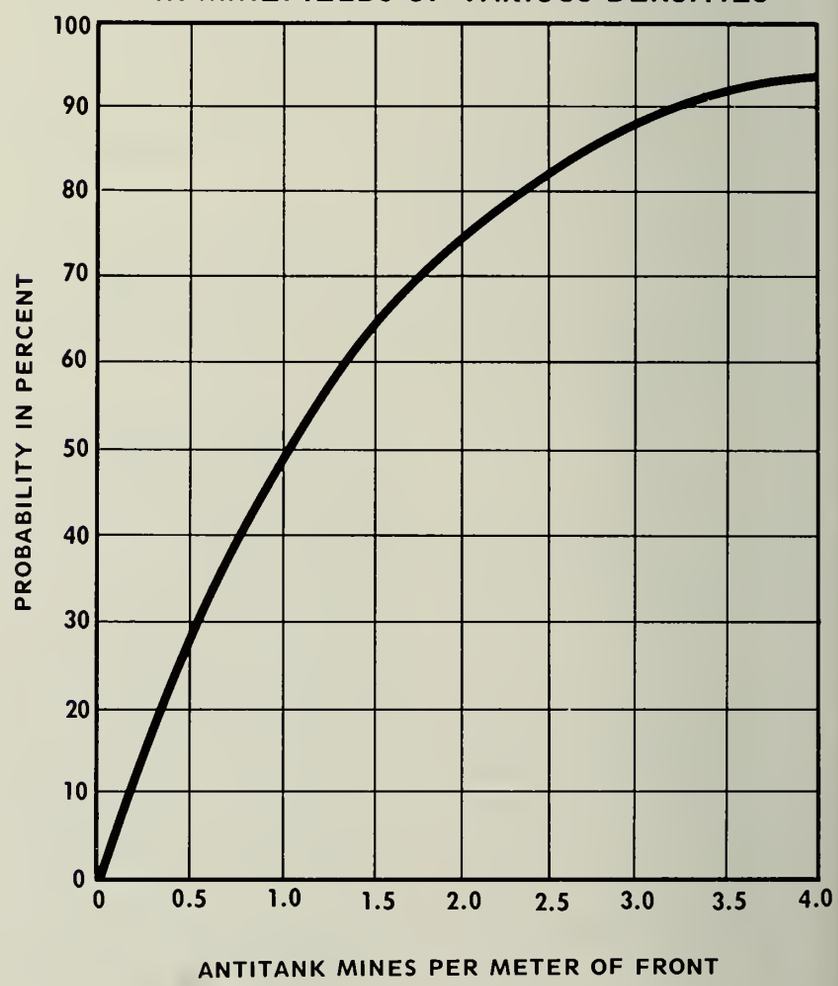
500 x 0.8 + .10 (500 x 0.8) = mines required = 400 + 40 = 440

In calculating the number of mines per row, you must allow at least six meters between mines to prevent sympathetic detonation (paragraph 4-4, FM 20-32). Therefore, 500 meters divided by six meters equals 83.3 mines, or rounded *down* to just 83 mines per row. The number of rows required is determined by dividing the number of mines required (440) by the number of mines per row (83). The result, rounded *up*, is six rows of 83 mines each.

III. PLATOON HOURS/ TRUCKS REQUIRED

The time required to emplace the minefield using the M57 ATMDS is calculated by dividing the number of mines by the M57 dispenser capability, which is 385 mines per hour (para F-5, FM 20-32). The result is 1.14 hours, rounded *up* to 1.5 hours. The number of 5-ton dump trucks required is determined by dividing the total number of mines (440) by the truck haul capability, which is 288 mines per truck (para F-4, FM 20-32). The result is 1.53 trucks, or rounded *up* to two trucks.

PROBABILITY OF A TANK ENCOUNTERING A PRESSURE-FUSED MINE IN MINEFIELDS OF VARIOUS DENSITIES



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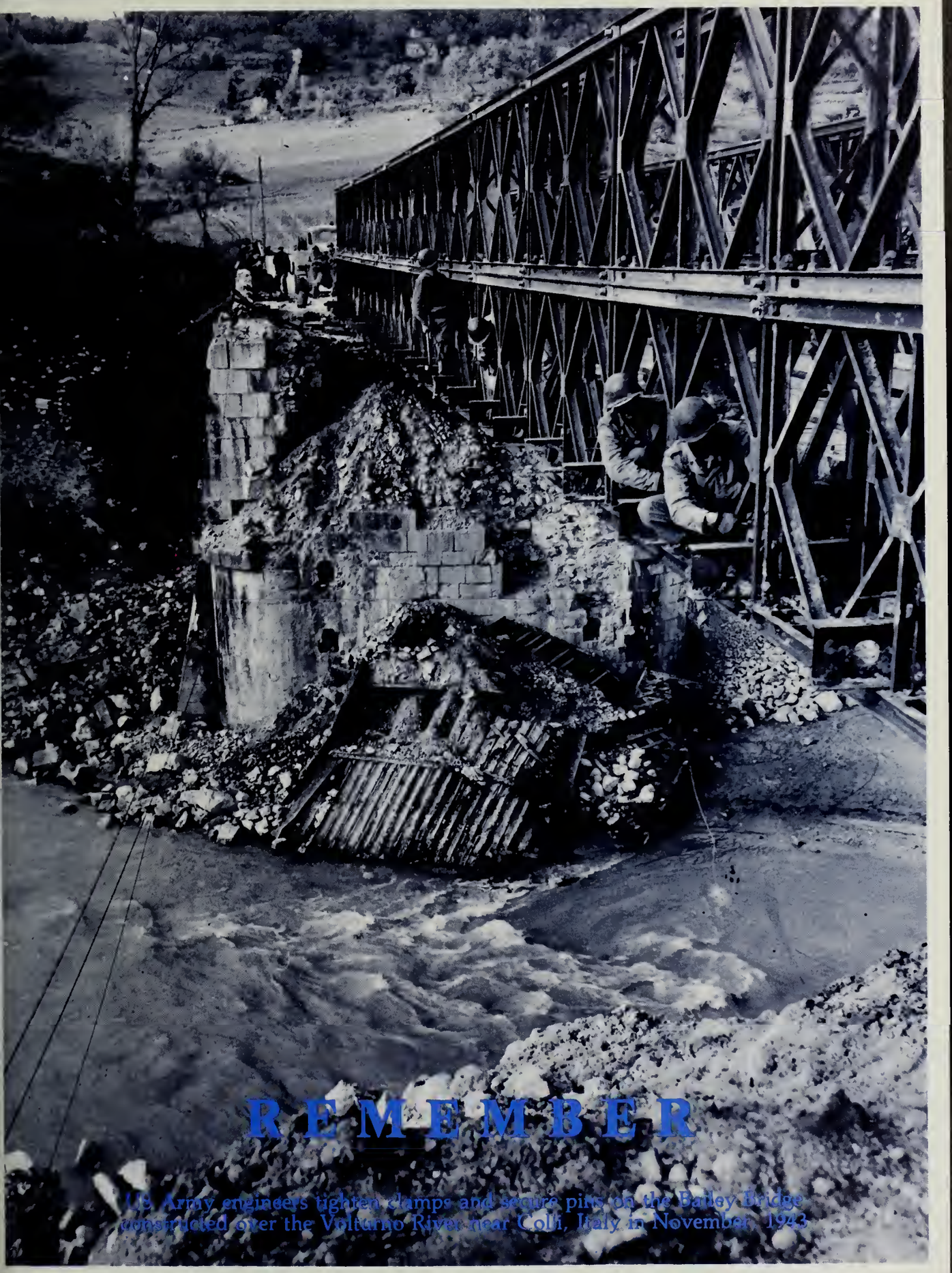

U.S. Army engineers tighten clamps and secure pins on the Bailey Bridge constructed over the Volturno River near Colli, Italy in November, 1943

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"As contrasting as life appears for soldiers serving in Germany and Korea, in Alaska and Panama, there is a common denominator. I have seen it from Checkpoint Charlie in West Berlin looking across a wall which has slowed but not stopped the flight of those desperate for freedom. And I have seen it from observation posts overlooking the barren emptiness of the Demilitarized Zone in Korea. It is the difference between democracy and totalitarianism. It is because of that difference that our soldiers willingly serve today."

—Clifford A. Alexander
Secretary of the Army

205

ENGIN

Engineer

Happy Anniversary!

THE MAGAZINE FOR ARMY ENGINEERS

SPRING 81

★ TEN YEARS ★

ENGINEER
MAGAZINE
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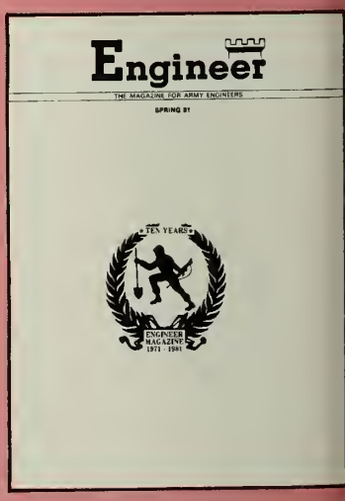
THE COVER

Engineer Magazine celebrates its 10th anniversary, **SPRING 1971-SPRING 1981**, with the publishing of this 37th issue. We are able to enter our 11th year only because of the many contributors who have supported ENGINEER over the years. Thanks to all for making these first 10 years such a huge success.



Engineer

THE MAGAZINE FOR ARMY ENGINEERS

LUME 11 SPRING 1981 NUMBER 1

FEATURES

10 TO SECOND LIEUTENANTS...AND TO ALL

by Maj. Gen. Clay T. Buckingham

13 PROFESSIONAL REGISTRATION FOR THE MILITARY ENGINEER

by Captains Robert W. McBride and Thomas B. Nelson

16 VERTICAL CONSTRUCTION TRAINING FOR SECOND LIEUTENANTS

by Maj. Lester C. Roth

18 THE EARTHMOVING PLATOON IN TANK DITCH OPERATIONS

by Capt. Michael L. Hoots

22 BRIDGE DEMOLITIONS IN THE FACE OF THE ENEMY

by Maj. Allan E. Younger

26 IF ITS QUALITY YOU WANT...

by Capt. Thomas B. Nelson

Page 10

Page 13

Page 26

DEPARTMENTS

2 CLEAR THE WAY

4 NEWS & NOTES

8 FORUM

21 THE PROFESSIONAL ENGINEER PROBLEM

25 THE PROFESSIONAL SOLUTION

30 ENLISTED CAREER INFO

32 OFFICER CAREER INFO

34 RESERVE COMPONENTS

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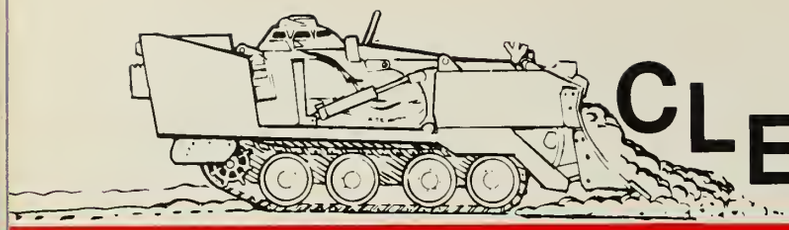

CLEAR THE WAY

Maj. Gen. Max W. Noah, a 1953 graduate of the U.S. Military Academy at West Point, NY, also attended the Engineer Officer Basic Course at Fort Belvoir, VA that year. Today he is Commandant of the U.S. Army Engineer School.

Other early assignments included airborne training at Fort Benning, GA, and a year as the assistant to the Area Engineer on the Corps of Engineers' Oahe Dam project in Pierre, SD. After completing his Master's Degree in Engineering at Purdue University, IN, Noah served as instructor, and later as assistant professor, in the Department of Electricity at the U.S. Military Academy at West Point. In 1966 Noah joined the newly-formed 45th Engineer Group, travelling with them to Vietnam as S-3. August 1968 Noah assumed command of the 307th Airborne Engineer Battalion, 82nd Airborne Division, Fort Bragg, NC.

His service then led him to Washington, D.C. where he was a military assistant to the Deputy Under Secretary of the Army for Operations Research in 1971. In 1973 he took command of the 2nd Engineer Group, Korea. In September 1980, Noah was assigned as the Commanding General, U.S. Army Engineer Center at Fort Belvoir, and, Commandant of the U.S. Army Engineer School, where he began his Army training nearly 28 years ago.

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by Maj. Gen. Max W. Noah

"We Have A Job To Do!"

As Commandant of the Engineer School I am inaugurating a personal column in "Engineer" to highlight important aspects of our military engineer business. This, together with your heightened personal interest as the engineer soldier reader, and your contributions, should serve to make this magazine a more professional and useful journal. In the true spirit of the military engineer I felt the best title of my piece should be "CLEAR THE WAY".

We engineers serve the Army in many ways. We are well known in combat as we assist maneuver, fire support, and combat service support forces on the battlefield. We provide the means to enhance mobility. We build protective structures for survivability. We are the first ones called to deal with mines and obstacles. On less active combat fronts, our design and construction skills are applied and known world-wide, and our construction contract management skill in the military and civil construction areas is without peer. Our burgeoning mission in facility maintenance is a challenge met daily. Our topographic support is an absolute must for a widely-deployed Army. Our work in generators and environmental equipment design and maintenance is key to the operation of the Army in the field. Clearly our mission is many-faceted and we must use a myriad of skills to do our job and do it well.

Our mission at the Engineer School, one of 16 branch centers in the Training and Doctrine Command, reads: "Provide the Army with Military Engineering Doctrine, Systems, and Training to improve readiness and modernize the force."

This includes all the aforementioned tasks. Paramount to doing that job correctly is *good communication between you and the school.* To that end I am hoping to visit as many engineer units as I can in the United States and overseas. Where we cannot visit, there is always the telephone and correspondence chain—I invite you to use those means. I have already visited a few units here in the United States and only recently returned from a trip to Europe. I am pleased with what I saw and I learned a lot.

A very critical area of current concern is the mode of operation, organization, and equipping of engineer units in the combined arms at Corps level and below, to perform in *mission areas of mobility, counter-mobility, and survivability* (M-CM-S). In the series of Army '86 studies a new thrust has been generated in how we, as combat engineers, do our business. For example, in order to be more responsive on the battlefield, the engineer unit in many situations is being assigned or attached at the lowest possible echelon. In this respect, the more decentralized we get in execution, the greater problem we have of overall control and preparation for engineer tasks at higher levels.

The engineer company which reports to the maneuver brigade commander must be more independent than in the past, know how to do its engineer unit mission well, and know equally well how to support the combined arms mission. The provision of an Assistant Brigade Engineer section should aid in this change.

Newer combat engineer equipment is vitally needed in order to provide more rapid, more responsive combat support of maneuver forces in the future. The M-9 Armored Combat Earthmover (ACE—UET is its old name) will make its debut in the 1982 procurement. New artillery delivered mines and GEMSS are in the Army's program. We are concentrating on the best solution for the countermine—SLUFAE, and other countermine equipment arena. I recently visited German, English, and Israeli engineer schools specifically to look at machines and ideas in M-CM-S. I found we have significant room for improvement in equipment and systems to support M-CM-S.

The Chief of Staff of the Army, as well as the Chief of Engineers, is very interested in moving forward. During early April, the Engineer School conducted a Systems Program Review (SPR) at Fort Belvoir in M-CM-S for the Vice Chief of Staff, General Vessey. The two-day program looked at the threat, the environment, and solutions to our problems in the combat engineers. With over 50 general officers from all branches present at the SPR we expect to profit greatly. We will report to you on the SPR in future columns.

We have a job to do.
"CLEAR THE WAY".

Noah
Engineer

NEWS & NOTES

BT: LONGER, TOUGHER

The US Army Training and Doctrine Command has announced that a longer, tougher basic training will soon face soldiers coming into this service. The new eight-week program is expected to replace the current seven-week training at some installations this year, with all training installations making the change by the end of FY 82. The revamped training leans heavily on the belief that a physically fit Army begins with tough, demanding standards established in basic, and continues through all phases of a soldier's professional growth. Increased emphasis will be placed on the basic soldiering skills, and new technical subject materials will be added, including communications, map reading, identification of opposing forces, and obstacle courses for confidence and conditioning. Changes are aimed at developing better trained, more disciplined soldiers who can contribute to Army unit effectiveness early in their careers. Steps will also be taken to assure soldiers better understand their role and commitment to the Army.

SEVEN NOMINATED FOR BG

The Pentagon has announced that the President nominated seven Corps of Engineers officers for promotion to the rank of brigadier general. Col. John H. Moellering, executive to the Army's Chief of Staff, will be the first of the Corps officers promoted, on approval of the list by the senate. Others nominated were: Col. James W. Van Loben Sels, commander of the 18th Engineer Brigade in Europe; Col. Jerome B. Hilmes, the facilities engineer at Fort Bragg, NC; Col. Forrest T. Gay III, Executive Director on the Chief of Engineers' Staff; Col. George S. Robertson, Deputy Director of Civil Works; Col. Thomas A. Sands, New Orleans District Engineer; and Col. Anthony A. Smith, of the immediate staff of the Chairman of the Joint Chief of Staff. The new generals will be reassigned within the next year to general officer posts throughout the Army. Their new assignments will be announced later.

PHYSICAL TRAINING STANDARDS RAISED

MEN UNDER 40

Age	Push-ups	Sit-ups	Two-mile run
17-25	40/68	40/69	17:55/13:05
26-30	38/66	38/67	18:30/13:40
31-35	33/61	36/65	19:10/14:20
36-39	31/60	34/63	19:35/15:05

WOMEN UNDER 40

Age	Push-ups	Sit-ups	Two-mile run
17-25	16/40	27/61	22:14/17:10
26-30	15/38	24/51	22:29/17:25
31-35	14/34	23/41	24:04/19:00
36-39	13/30	21/31	25:34/20:30

The Army's new Physical Readiness Test will be applied to men and women, who will be tested in three events this year. The scoring table above shows the minimum/maximum needed to pass the test, which is given bi-annually. All soldiers except those in basic training must score at least 60 points in each event, and have a total of 180 points. Soldiers more than 40 years of age must have a medical clearance by an Army doctor before taking part in the program. Once the soldier has been cleared, a six month conditioning program must be completed before the two-mile run test will be given. The Over-40 run is graded on a go/no go basis. DA training officials say a new APRT manual published in January 1981 should provide you with complete details of the overall program.

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CORPS GETS OFFICIAL CREST

The US Army Institute of Heraldry has approved an official unit crest for the US Army Corps of Engineers, recognizing its status as a Major Army Command. The crest is expected to be issued in pairs early this year, and is authorized to be worn on the uniform shoulder loops of the Corps commander, his deputy, and all Corps military personnel in field operating activities. The same personnel will continue to wear the red and white unit patch on their uniform sleeve, as well as the castle insignia on their lapels. The crest shows a gold eagle, symbolizing the nation, standing behind a scarlet and white castle tower that symbolizes the Corps and its construction mission. The worldwide scope of the Corps' mission and its service to the nation in the past, present, and future are represented by a blue globe surmounted by a rising sun. The globe is garlanded on one side with gold olive branches, denoting the peaceful nature of the Corps mission, and on the other side with oak leaves, symbolizing strength and fortitude. The branches also represent the Corps' concern for the environment. In its beak, the eagle holds a blue banner inscribed with the Corps historic motto "Essayons".

CHIEF VISITS CORPS DAM

Army Chief of Staff Gen. Edward C. Meyer toured the McAlpine Locks and Dam at Louisville, KY, during a day-long visit to the Corps' Louisville District Office in December. It was believed to be the first visit to a purely civil works district by an Army Chief of Staff. Meyer's tour included stops at the Louisville Repair Station, home of the District Repair Fleet, and the construction site of the multipurpose Taylorsville Lake near Louisville. According to District Engineer Col. Charles E. Eastburn, the Chief's visit was "tremendous for District morale."

ENGINEER DINNER DATE SET

US Army Engineer Officers should circle Friday, May 15 on their calendar in red! That's the date of the 114th Annual Engineer Dinner at Mackenzie Hall, Fort Belvoir, Va. Engineers from all over the world will gather for an evening of reunion, and to see who will receive the annual Itschner and Sturgis Awards, presented to the outstanding Engineer company and the outstanding Engineer enlisted soldier. Chief of Engineer Lt. Gen. Joseph K. Bratton will be the keynote speaker for the evening. The 5th Annual Counterpart Dinner for spouses of Engineer Officers will also be held May 15, and the Castle Ball is slated for Saturday, May 16. Tickets for the Engineer Dinner are $13.35 per person and may be ordered in advance by sending check or money order, payable to the 114th Annual Engineer Dinner, to the Protocol Office, US Army Engineer Center, Fort Belvoir, VA. 22060. For futher information, contact the Protocol Office at (703) 664-4300, or Autovon 354-4300.

TDFO FORMED

The newly organized Training Development Field Office (TDFO) has combined the training development office of the Directorate of Plans, Training, and Security, USATC Engineer and Fort Leonard Wood, the USAES Engineer Field Office, and the 62B Team from the Directorate of Training Development, USAES, Fort Belvoir, Va. TDFO is now a tenant unit at Fort Leonard Wood, MO. The Training Development Field Office has the mission of developing new courses and revising existing courses of instruction for Engineer MOS's trained at Fort Leonard Wood, reconfiguring engineer resident courses for use by the US Army Reserve Component, implementing a staff and faculty development program, and performing staff functions for DPTS as resources permit. In addition, the TDFO serves as the US Army Engineer School's point of contact at Fort Leonard Wood and provides interface between Fort Leonard Wood and proponent schools for Basic Training, Ordnance, and Transportation training conducted there.

NEWS & NOTES

76TH ENGINEERS SUPPORT SCOUTS

When the Tenth National Scout Jamboree gets underway at Fort A.P. Hill, VA, next summer, the 76th Engineer Battalion will be there—in spirit if not in body. Over the last year, the Fort Meade, MD based engineer unit has accomplished the bulk of extensive physical site preparations necessary for an event expected to involve 30,000 Boy Scouts and staff, and 10,000 visitors per day. The centerpiece of their efforts was the construction of a 17½ acre natural amphitheatre, scheduled to serve as the focal point of jamboree activities. The amphitheatre will seat 70,000 spectators on a fan-shaped hillside which slopes inward toward a three acre stage area. The Jamboree, scheduled for July 29 through August 4, 1981, will create, virtually overnight, a small city within Fort Hill.

POV HEADACHES

Despite an embargo on the shipment of all privately owned vehicles (POV's) manufactured after 1976, many unauthorized POV's have reached the Yokohama Terminal, Japan in recent months. The embargo—in effect since 1977—was imposed by DOD because of the personal and financial hardship on service members shipping their POV's to Japan or Okinawa. Extensive, and expensive, modifications must be made on vehicles in order to meet the strict environmental and safety standards set by the government of Japan. Although POV's made before '76 are not embargoed, soldiers planning shipment still need to take precautions. Contact your sponsor on the cost of insurance, taxes, and registration fees, and the local transportation office for information on Japan's vehicle emission standards. Plan before an anticipated move to Japan or Okinawa and save yourself a headache.

MOBILE HOME MOVING

A new bill went into effect recently that allows the full cost of moving a mobile home during a PCS move to be paid by the government. Before the bill was signed, soldiers were only allowed 74 cents a mile to move their mobile homes to a new duty station. Now the government will pay, as long as the cost does not exceed the amount it would cost to ship a soldier's maximum weight of household goods. There are a few catches, so contact the transportation office for full details.

457 MILLION VISIT COE SITES

More than 457 million people visited US Army Corps of Engineers lakeside recreation areas in 1980, six million more than the previous year. Four hundred twenty-six Corps lakes and reservoirs provided a wide variety of outdoor recreation opportunities, and nearly 80 percent of these areas are within a 50-mile radius of urban areas with a population of more than 50,000. Although Army Engineer recreation areas are water-oriented, offering excellent boating and fishing opportunities, they are attracting an increasing number of tent, trailer, and motorhome campers. Usage by day visitors is up as well. There were 30 million days of use in 1952 when the Army Engineers first started counting visitors. A day of use is counted for every person entering an Army Engineer recreation area for recreation activities during a 24-hour period. In 1971 there were 310 million days of recreation use, and in 1979 that figure jumped to 449 million. The top five Corps lakes and reservoirs, according to COE day use tabulations, were: Buford Dam, in Lake Sidney Lanier, GA; Hartwell Lake, in the states of Georgia and South Carolina; Denison Dam, in Lake Texoma, TX; Allatoona Lake, in the state of Georgia; and J. Percy Priest Dam and Reservoir, in the state of Tennessee.

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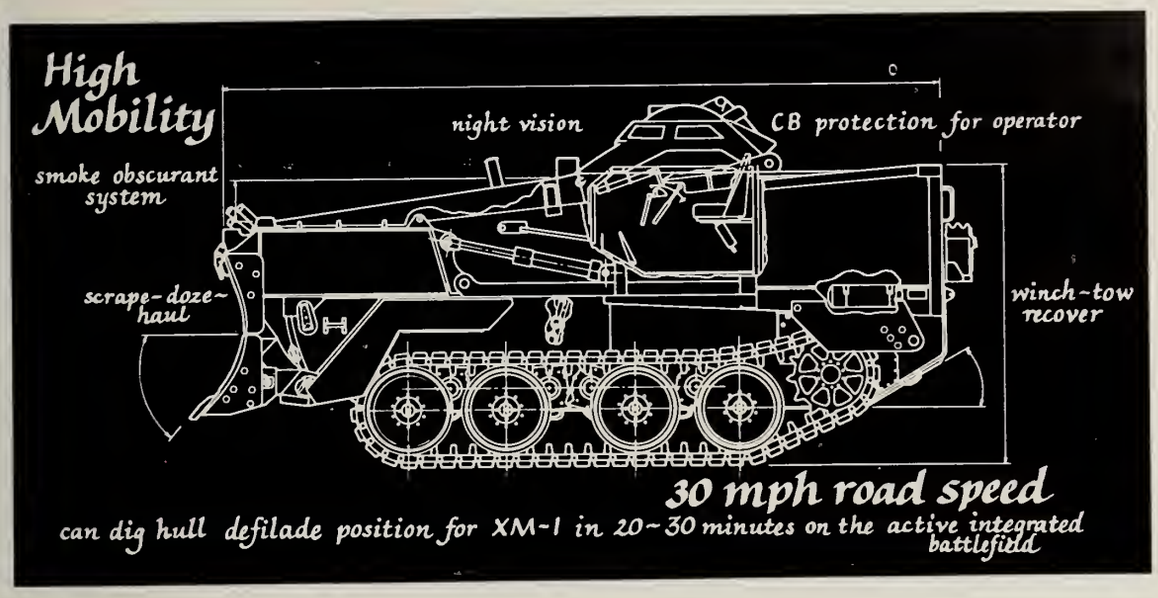

M-9 ARMORED COMBAT EARTHMOVER

The Universal Engineer Tractor is no more, at least not in name. The vehicle, designed to give Engineers a tactical earthmoving capability and essentially the same mobility at the units they support, has been re-named the M-9 Armored Combat Earthmover, to reflect the wide variety of missions it can accomplish in a combat environment. The M-9 is much more than just a tractor. It will provide combat engineers, especially those supporting mechanized and armored units, with a versatile, tactical earthmover sufficiently mobile to provide support in the ground gaining environment of the forward battle area. It is designed to travel light and work heavy. Features include a front loading scraper bowl and a hydraulically operated apron with positive load ejector. The dozer blade is hinged and can be folded to increase the angle of approach when the tractor is used as a transporter. The M-9 converts to an armored vehicle by closing an armor hatch stored behind the operator, who is the only crew member. Dozing and scraping are accomplished by raising and lowering the entire front of the tractor by means of the hydropneumatic suspension system, rather than by independent operation of the blade and bowl. The supension system can be altered according to the type of terrain that needs to be crossed. The M-9 is capable of speeds up to 30 mph, and it has a limited swim capability approximately equal to that of the M113 APC. The M-9 will increase the survivability of other combat vehicles, too, as it can rapidly dig protected positions for tanks, and firing positions for artillery.

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ONE EXAMPLE OF INEFFICIENT EQUIPMENT

by Staff Sgt. Philip Powell

"Basically, all these components are adapted from commercial blasting supplies...(and) are neither quick nor efficient in combat."

After three years as a front line combat engineer with US forces in West Germany, I am of the opinion that slow acquisition, and in many cases slow development, of essential materials is hindering engineer effectiveness and readiness. The majority of the equipment used by our engineers is either World War II vintage, or a quick adaptation of commercial equipment. As a result of not being properly equipped, not only are engineers hampered, but their potential contribution to the combined arms team is reduced. The following example illustrates this ineffectiveness in one engineer area, demolition materials.

In the current state-of-the-art, explosive demolition charges are primed for one of two means of ignition: electric or non-electric. The materials used date from World War II and before, and consist of: blasting caps, electric or non-electric; crimpers, for crimping non-electric caps to fuse; friction tape, for fixing caps to detonating cord; and detcord clips for joining several branching lines of detcord into one main firing circuit.

Basically, all these components are adapted from commercial blasting supplies. As such, they are neither quick to use nor efficient in combat. As a result, the combat engineer, just to prime a circuit, carries a gadget bag of caps, clips, crimpers, and tape. The dexterity needed to use these components requires bare hands. In total darkness, under enemy fire, and with numbed fingers, this is like trying to button a shirt without using your thumbs.

The solution to the particular problem lies in setting aside the civilian expedients and designing a new component strictly for military use. This component, which I call an Exploding Connector—or Exploder—would be cheap, effective, and extremely versatile in military demolitions. (Figure 1).

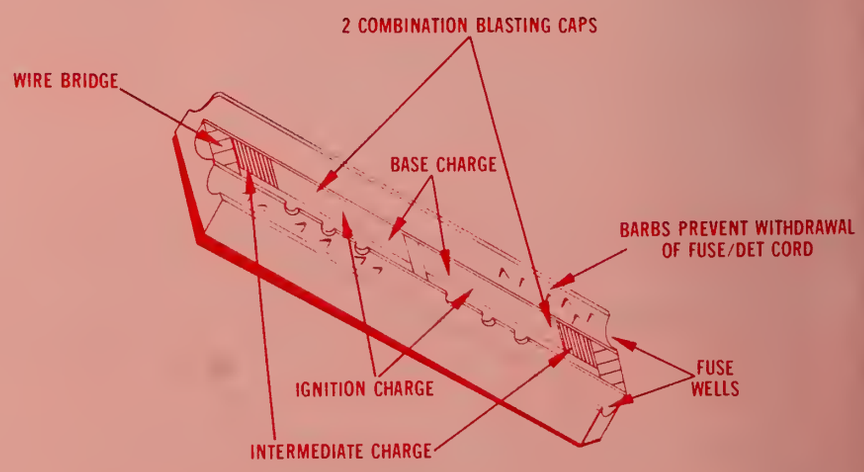

Figure 1

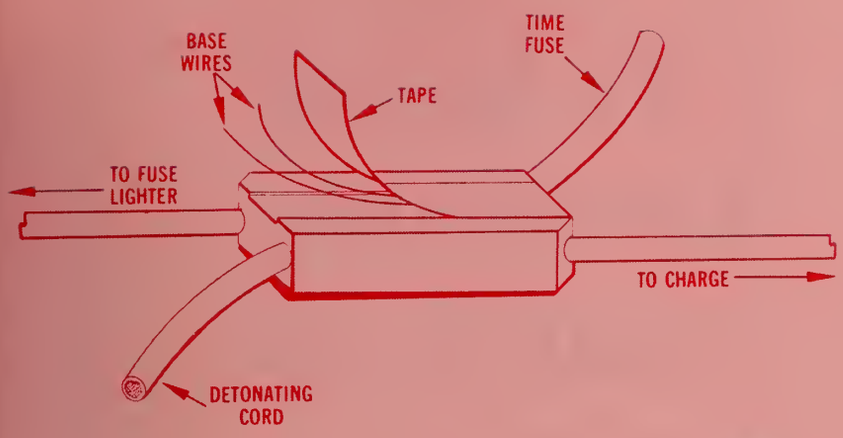

Figure 2

Constructed of hard plastic, the Exploder would measure approximately 3" by ¾" by ½". Two fuse wells, sized to accept standard time fuse or detcord, would extend through the length of the device. Aligned end to end, between the two fuse wells, would be two unique, combination blasting caps. These caps are unique because they may be ignited either electrically or non-electrically.

On each end of the Exploder, one corner of the case would be notched to facilitate use in the dark. Each of the combination caps could be ignited by a fuse inserted through either fuse well. Barbs lining the fuse well would prevent fuse or detcord from pulling back out once it has been inserted.

The opposite ends of the two combination caps would be equipped with base wires for electric ignition, laying along the top and bottom sides of the Exploder. These wires would lie in a shallow groove in the plastic body, and be covered with adhesive tape if not in use. (Figure 2).

Using an Exploder to prime a firing circuit would be fast and simple compared to current methods. For electrical detonation or detonation of detcord, the detcord is inserted into either fuse well and the base wires are connected to the firing wire. For non-electric priming of detcord, time fuse is inserted into either fuse well, and the detcord is inserted in the other well. Compound priming is accomplished by combining the two methods (i.e., the circuit is rigged to be fired either electrically or non-electrically).

Since the Exploder contains two independent blasting caps, either one of which can function electrically or non-electrically, a failsafe factor is incorporated that would allow dual priming, per current Army policy, with a single Exploder.

Under combat conditions, the Exploder could quarter the time currently required to prime a firing circuit. It would eliminate the need for seperately issued electric and non-electric caps, and require no crimpers, clips, or tape to install. Best of all, it could be easily and quickly installed in complete darkness, it would be easier to handle than a standard blasting cap, and would be impervious to corrosion.

That such a device has not yet become a standard component in engineering demolitions sets is indicative of a serious problem: the lack of cogent rapport between the industrial producer and the military consumer, and the failure of current acquisition programs to address fundamental engineer problems within the constraints of cost and technological feasibility.

SSG PHILIP F. POWELL is a combat engineer currently assigned to Ft. Polk, Louisiana, having recently returned from assignment in Germany.

The Professional Journal of Army Engineers

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To Second Lieutenants... And To All

by Maj. Gen. Clay T. Buckingham

Maj. Gen. Clay T. Buckingham, Assistant Chief of Staff for Automation and Communications, recently addressed Second Lieutenants graduating the U.S. Army Engineer School Officer Basic Course. His remarks follow.

I want to talk to you this morning about what kind of Army you are going into, and what your role is in that Army.

Most of you are going to be assigned to a specific unit somewhere, either in the continental United States or overseas; Korea, Alaska, Hawaii, Panama, or Europe. This unit is probably going to be understrength in both noncommissioned officers and enlisted men, and will have a mixture of modern and obsolete equipment.

The soldiers (men and women) will be young, with an average age of 18 or 19. Your platoon will be multi-racial, and probably multi-lingual. Many of your men and women will have graduated from high school, but some will not have graduated from high school. They will come from all parts of the United States and its possessions. They will represent a wide variety of attitudes, values, moral standards, motivations, and abilities. Your noncommissioned officers will also be relatively young, mostly in their 20's. You will be short certain key noncommissioned officers, and those that you have will also represent a variety of abilities and motivations.

You will immediately recognize that your platoon has an awful lot of equipment. All of this equipment has been assigned to help you perform your mission. This equipment will range from the individual weapons and equipment of the soldiers to the collective equipment of the platoon. That is, the vehicles and other mission oriented equipment.

One of the first things you must do is to take measure of your platoon, both the people and the equipment. Determine the status of training and maintenance. Establish this as the baseline, accept the platoon as it is, and start from there to make it the best platoon in the United States Army. You must apply your total energies toward making this platoon the best one in the Army. Complaining about the abilities of your people, the shortage of people, or the condition and capabilities of your equipment will not help.

Let me say right here that the Army understands the situations that you are going into and is striving to improve the general, personal, and equipment status of the Army. You must have faith that the Army's leadership is doing this. I can guarantee you from having just spent a solid week in the Army Four-Star Commanders' Conference that the Army leadership understands your situation and is doing everything within its power to make improvements. So, complaining about your situation is not going to help anything. As a matter of fact, it will detract from your primary mission, which is to build your platoon into the best one in the US Army.

Now, I want to give you some hints as to how you can do all of this. First let me tell you that there are two people who will rapidly loom as the most important two people in your life as a platoon leader. The first is your Company Commander and the

second is your Platoon Sergeant. With regard to your Company Commander, you are a follower. With regard to your Platoon Sergeant, you are a leader.

Never forget that your Company Commander is just that; he commands the company of which your platoon is a part. He is your boss. You must learn to relate to him in a healthy, constructive, subordinate-superior relationship. You must continually look at yourself as he looks at you, and seek to be the kind of platoon leader that you would like to have if you were the Company Commander. You may disagree with him on things and, of course, it is your right and responsibility to make recommendations to him in an objective and responsible manner. But he has the final say and you must support him loyally and effectively. You must seek to help him to do his job and to make him successful in his job as Company Commander. You can do this by making your platoon the best platoon in the Army.

Your Company Commander is not really interested in where you went to college, or whether you were a football star, or whether you were President of your fraternity, or have an MS in Civil Engineering. What he is interested in, is how well you command your platoon.

With regard to your Platoon Sergeant, you are a leader. You are his Commander, and you should seek to develop with him a healthy, constructive, superior-subordinate relationship. Once again, you must look at yourself from his viewpoint and seek to be the kind of Platoon Leader that you would like to have if you were the Platoon Sergeant.

Thus, I say to you that these two people, your Company Commander and your Platoon Sergeant, will be the most important two people in your life as a Platoon Leader. Of course, there are other people to whom you must relate: the First Sergeant, your fellow platoon leaders, the Company Executive Officer—if your have one—the other noncommissioned officers within your platoon, and the enlisted men within your platoon. But, never forget the importance of these two people, the Company Commander and your Platoon Sergeant.

I must emphasize that you are a Platoon Leader and not a Battalion Commander, a Brigade Commander, or an Army Commander. During your four years of academic training at the University of your choice, you have studied a variety of subjects. Basically, that education was designed to teach you how to think. Now, as a Platoon Leader, it is your job to focus all of the intellectual powers that you have specifically on your platoon. Do not seek to solve the world's problems or the Army's problems or even your Battalion Commander's problems. Confine your attention primarily to your own company, and specifically, toward your own platoon. Throughout your career, the people who are most important to you are your contemporaries; your immediate superior, and your immediate subordinates.

Your two most important tasks will be the training of your men and the maintenance of your equipment. You may have a lot of other things on your mind, but the most important things that you will ever do as a Platoon Leader will be to train your Platoon and to maintain your equipment. Superior training and superior maintenance are your primary goals. In training, you must be the coach. You must know your men, the status of their training, where they are coming from, and then you must train them to do the jobs that they are specifically responsible for within your platoon.

With regard to your equipment, you must learn not only what the equipment is used for but also how it operates and how it should be maintained. You must become the expert on the equipment in your platoon. You must study the manual, crawl in and out of the vehicles, learn to operate the vehicles and weapons, learn to operate every piece of equipment that you have in your platoon, and know specifically what standards of maintenance the Army requires. You must then set the standards for your platoon and enforce those standards.

Now, with regard to the relationship between yourself, your Platoon Sergeant, and your noncommissioned officers. If you do not have a copy of Field Manual 22-600-20, dated March 1980, entitled, "The Noncommissioned Officer Guide," you should get one. This little manual identifies the place of the noncommissioned officer in the United States Army. There are chapters on leadership,

authority, the officer chain of command, the NCO support channel, duties and responsibilities of the noncommissioned officer, and the relationship between noncommissioned and commissioned officers. It is specifically written for the noncommissioned officer, but you should read this manual, comprehend it, understand it, and then insist that your noncommissioned officers comply with the provisions of this manual.

Your job is to train your noncommissioned officers to do their jobs and then to insist that they do those jobs. You are not to do these jobs for them. This is a fundamental mistake which many junior officers make and that is to bypass their noncommissioned officers and deal directly with the enlisted men of their platoon. The noncommissioned officer is the first line leader in the Army. As the platoon leader, you must insist that your squad leaders or section leaders do their jobs. And I say again, you are not to do those jobs, but you must insist that your NCOs do their jobs.

The noncommissioned officer at this level is the glue which holds the Army together. You can subvert the whole system of discipline within the Army if you try to do the NCOs job for him, or if you do not insist that he do his job. I cannot overemphasize this point. Give your noncommissioned officers the responsibility and the authority identified within this manual and then insist that they fulfill those responsibilities and exercise that authority. By so doing, you will be training your NCOs in leadership.

Now, for a few one-liners which apply to your responsibilities as a Platoon Leader.

1. You are responsible for everything your Platoon does or fails to do, 24 hours of every day, seven days a week. You will have more responsibility as a Platoon Leader than most people have in a lifetime.

2. The Army is built on integrity. You should never, under any circumstances, compromise on integrity. However, you must learn to tell the difference between an issue which involves integrity and an issue which simply involves procedures. Ninety-nine percent of the issues are procedural, and probably only one percent specifically involves issues of integrity. I say again, never compromise where integrity is involved, but be flexible with procedures and learn to tell the difference between an issue involving integrity and an issue which is simply one of procedures.

3. Troops want a strong, intelligent leader. They thirst for leadership. They want tough training. They want tough, competent leaders. Do not let them down by being a weak and ineffectual leader.

4. Do not be fooled. The small percentage of your troops who will be squawkers do not represent the majority. And even those who constantly squawk respect and want strong leadership.

5. Your appearance does make a difference. Learn to present a strong and confident appearance. Keep your hair cut, your boots shined, and your shoulders back.

6. Do not take counsel of your fears. Just go ahead and do your job.

7. Physical training is extremely important. You should strive to be in better physical shape than any man in your platoon and then you should strive to bring them up to your standard.

8. Remember that in any operation, or in training or maintenance activities, 10 percent of your effort will be in planning and giving instruction. The other 90 percent should be in the follow-through and supervision.

9. Not all of your soldiers will succeed. Even with the best leadership, some will fail. Learn to determine the difference between those who are simply immature, but have potential, and those who simply will never be able to make it.

10. Build confidence. Confidence comes through a series of little successes. Every time a soldier does something right it adds to his confidence. Good soldiers are confident soldiers. You can build their confidence by leading them from success to success in little things.

11. There are three things where you must be absolutely precise. These are in the handling of money, in the handling of supplies and in the handling of classified documents.

12. Do not give your signature away lightly. Know what you are signing.

13. Never, under any circumstances, lend money to an enlisted man. It is simply bad practice. If he really needs money, there are ways of getting it for him through the Red Cross, through the Army Emergency Relief or through a partial payment.

14. Respect your First Sergeant. Do not hang around his office, do not lean on his desk, and do not sit in his chair. Remember, the First Sergeant is the top noncommissioned officer in your company and deserves your respect. Listen to him. He can teach you much.

15. In your personal conduct, you must be moderate and self controlled. A drunk or a playboy has no place in the Officer Corps.

Lastly, recognize that your career is built one day at a time. Thereto strive for excellence in all things. And particularly, develop an excellent spirit. In the Old Testament, Daniel rose to the top of his profession because he had an excellent spirit. Don't be simply a critic. No one will follow a critic. Look at everyday and every situation positively. For after all, "This is the day that the Lord hath made. Let us rejoice and be glad in it."

I envy you the opportunity once again to command a platoon. You can make it a great experience and thereby establish a small but important island of competence within the US Army. It's in your hands.

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PROFESSIONAL REGISTRATION FOR THE MILITARY ENGINEER

by Captains Robert W. McBride and Thomas B. Nelson

Registration as a Professional Engineer establishes an accepted standard of technical excellence within the engineering profession. Registration also provides a tangible method of qualifying an individual's level of expertise as an engineer and as a professional within the military structure. Supplemental to the recognized standard established by registration, the continuing development of technical proficiency is achieved or fine tuned.

In September 1979, in a letter written by the Chief of Engineers, an objective was established that by the summer 1981 "all District engineers be professionally registered, and that all Deputy District engineers be registered as Professional or In Training".[1] In the coming years, selection for District engineers will thus be based less on whether an officer's initial entry is Specialty Code 21, but more on the individual's managerial, technical and demonstrated engineering capabilities. Professional registration is an indication of these capabilities. Although registration is not an immediate concern for the junior military engineer, the effort necessary to obtain registration increases tremendously as the years away from formal schooling mount.

As evidence of this recent emphasis on Professional Engineer Registration for military officers, the US Army Engineer School has experienced a dramatic increase in inquiries and requests for assistance from the active military sector. In view of the above desires for PE registration by military engineers, this article is provided to outline the steps leading toward registration. These steps are derived from experience with the registration process in the Commonwealth of Virginia, and with study programs available in the Northern Virginia area. Most of the steps described, with some variations, can be applied to the registration process in other states.

STEP ONE: MEET BOARD PREREQUISITES.

The three general prerequisites for examination are:

a. Graduation from an ACPD/ABET[2] accredited school with an engineering degree. Several states will accept degrees in engineering from non-

[1]Letter, Subject: OPMS and Professional Engineering Excellence, dtd 19 Sep 79, from LTG J.W. Morris.

[2]Engineers Council on Professional Development, renamed Accreditation Board of Engineering and Technology on 1 January 1980.

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Use as many different study materials as you can find.

accredited schools, while others allow substitution of additional experience in lieu of graduation from non-accredited schools or for degrees other than engineering. Check with your State Board of Examiners for verification, as necessary.

b. Certification as Engineer-in-Training (EIT). EIT certification is achieved by passing an eight hour examination on Fundamentals of Engineering. This is a national exam given twice annually. Excellent references describing the content of the exam are available in most libraries and engineering or technical book stores. Some states allow applicants for PE registration to take both the EIT and PE exams on successive days.

c. Four years of approved engineering experience. Military experience is acceptable if it shows "responsible charge" of engineering work; "responsible charge" meaning a position requiring initiative, skill and independent judgement in the planning, design and supervision of engineering projects and activities. The experience gained by the junior military officer in the Corps of Engineers often involves these functions, and should not be overlooked by the applicant because he did not carry the title of "Civil Engineer" or "Project Engineer". The applicant must describe his experience in terms understood by board members unfamiliar with the military. For example, experience as Platoon Leader can read: Responsible for operations and training of 40 engineering personnel and equipment. Designed, planned and supervised construction of a 2 mile bituminous road; 250 sq. yd. parking apron, 30 ft. timber tower and 3000 ft. of fencing. Supervised borrow pit operations and completed barracks renovation project budgeted at $250,000. Avoid acronyms and abbreviations. Experience in non-engineering military assignments should not be listed as qualifying experience.

STEP TWO: COMPLETE THE APPLICATION.

Obtain an application from the State Board for Professional Registration, usually located in your state's capital. Virginia applications are available from the P.E. Program Coordinator at Fort Belvoir, as well as from the state board. When requesting the application, also request a copy of regulations governing registration necessary to help you satisfy any special state requirements. Type the information neatly and completely. Do not use continuation sheets unless specifically permitted.

STEP THREE: VERIFY EXPERIENCE AND EDUCATION.

Military experience can usually be verified by the signature of the Installation Records Officer who maintains your personnel files. Civilian experience must be verified by personnel managers from each engagement. Education must be verified by the school directly; through submission of an official transcript or completion of a form supplied with the application. EIT certification is verified by the State Board.

STEP FOUR: GET ENDORSEMENTS OF PROFESSIONAL ENGINEERS.

Most state boards require endorsements of three to five registered PE's; some of whom must be registered in the state of application. Junior officers should start keeping a record of possible endorsers as early as possible in their careers, and should not be hesitant to ask university professors or Engineer School faculty to make such an endorsement. Recommendations from registered Engineers should be based upon work demonstrated while under their supervision or instruction.

STEP FIVE: PAY ALL FEES.

Submit the required fee by check with your application. Most fees will range from $25 to $100 (Virginia charges $30), with an exam fee to be paid

following approval of your application. The exam fee is currently $18.

STEP SIX: ENSURE TIMELY SUBMISSION OF ALL PAPERWORK.

The state board will require submission of the application and all supporting endorsements and transcripts 60 to 90 days prior to the examination. Submit your paperwork early and follow up on endorsements. Boards will not act on an incomplete file.

STEP SEVEN: STUDY

Utilize as many different sources of study material as you can find. Some excellent sources are:

a. *Texts.* Reference books from the Engineer School or college with which you are familiar are excellent study materials. Review class notes and refresh your knowledge of engineering disciplines.

b. *USAES Correspondence Courses.* PE study courses are available in several disciplines, and may be requested by completing an application, available from: US Army Engineer School, ATTN: ETM Branch, Fort Belvoir, VA 22060.

c. *University Review Courses.* Many universities offer review courses in several disciplines at their main and regional campuses. The University of Virginia, for example, conducts courses at Fort Belvoir and other Northern Virginia locations prior to each exam. Contact your education center for information.

d. *Informal Group Review.* USAES personnel conduct a Civil Engineering lunch hour review four weeks prior to exam dates, and are currently writing a course which can be used by other military installations.

STEP EIGHT: TAKE AND PASS THE EXAM.

The Professional Engineer exam is an eight hour exam administered in April and October/November. Specific test dates and locations are determined by each state board. Most states, including Virginia, use a national exam. Examinees may take the exam in any one of the following disciplines:

Civil	Agricultural	Petroleum
Chemical	Ceramic	Sanitary
Electrical	Industrial	Structural
Mechanical	Manufacturing	Aeronautical/ aerospace
Combined*	Nuclear	Mining/Mineral

*The combined engineering exam includes the disciplines of civil, chemical, electrical and mechanical engineering. The discipline to be examined must be selected prior to the morning session, and cannot be changed once the exam has started.

Each examinee will be given a problem booklet for the four hour morning session containing 10 problems in the discipline selected. The examinee will work four problems for credit. The afternoon problem book will contain ten problems, nine new problems in each discipline and one engineering economics problem common to all disciplines. As with the morning session, four problems will be worked. In most states the engineering economics problem may be included as one of four problems solved, while some states require that it be worked by all examinees. A small number of states do not allow the problem to be solved for credit. Check with your state board for specific requirements.

Examinees selecting the "combined" discipline may work any four problems from the disciplines of civil, chemical, electrical and mechanical in each session. Problems may be selected from one discipline or any combination within the combined selection.

Problems are graded based on work accomplished, with partial credit given for partial solutions. 10 points are allowed for each problem, with a perfect score of 80 points. 70% correct, or 56 points, are required to pass the exam. All problems have equal grade weight.

All bound references are allowed in the exam, as are silent calculators. Check with local exam sites about availability of electrical outlets. All assumptions made in the solution, as well as references used, should be listed on the solution to ensure full credit.

These steps and descriptions are not going to answer all questions, and may raise additional inquiries. Questions should be addressed to state boards, registered PE's or the PE Program Coordinator at the Engineer School. We hope that the engineer, military or civilian, reading this article may be encouraged and assisted in his pursuit of registration. Engineer registration is the most acceptable and most important evidence of professional competence, and although the preparation may be trying, their final results are well worth the effort.

Capt. Robert W. McBride is the Assistant Secretary to the General Staff, U.S. Army Engineer Center and Fort Belvoir. McBride is a licensed Professional Engineer and serves as proctor for PE/EIT examinations for the State of Virginia. Capt. Thomas B. Nelson is an instructor in the Roads and Airfields Branch, Department of Military Engineering, U.S. Army Engineer School. Nelson also serves as Program Coordinator for Professional Engineer Registration.

VERTICAL CONSTRUCTION TRAINING for

SECOND LIEUTENANTS

by Maj. Lester C. Roth

The modern battlefield is envisioned as a short, intensive conflict with engineer effort priority in support of the Combined Arms Team. Accordingly, vertical construction training for second lieutenants has been reduced in recent years. However, the vertical construction mission still exists, especially in support of peacetime requirements. It is important, therefore, that field commanders be aware of the capabilities and limitations of second lieutenants assigned to their commands from the Engineer Officer Basic Course (EOBC).

An increasing number of lieutenants commissioned in the Corps of Engineers do not have engineering or engineering-related degrees. The thrust of EOBC training, therefore, is to prepare young engineer officers to manage a construction project as opposed to the designing of buildings or utility systems. Such training, requires at least a rudimentary understanding of the technology involved. Classroom instruction focuses on terminology and a few of the basic principles involved. Let's follow a typical EOBC student through his program of instruction:

The student first receives a two-hour class on plumbing systems. Nomenclature, advantages and disadvantages of various materials available, selection of fittings, and functioning of the drain, waste, and vent systems are covered. The next three-hour block deals with construction print reading as it applies to plumbing systems. Drawings from the Army Facilities Component System (AFCS) are used by the student to prepare a bill of materials, correctly specifying all pipes and fittings.

Next, the second lieutenant performs a four-hour, hands-on practical exercise in installing plumbing systems. Students are split into groups of 4-5 and given a set of construction plans. They are required to install and check the plumbing. They must interpret the plans, submit the appropriate BOM, and use the pipefitters tool kit to install the iron and copper piping. Their plumbing is pressurized with a water hose and critiqued. Demonstrations are given on plastic and other types of piping.

Electrical classes follow the same basic format. A two-hour class on

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nomenclature, principles of operation and basic circuitry, followed by a three-hour class on print reading and preparation of BOMs. Only interior wiring is covered. A four-hour practical exercise follows in which small groups install outlets, lights, 3-way switches, special purpose outlets, circuit breakers, etc., according to a given set of plans.

Next is a two-hour inspection class. Students are provided with a set of construction drawings for the electrical and plumbing system of a Theater of Operations bath house and latrine which have been constructed with various deficiencies. The students are taught how to conduct an inspection as well as the typical things to look for. Emphasis is placed on identifying the deficiency; determining why it happened; evaluating the deficiency's effect on the system; and if necessary, stating the corrective action required.

Short classes totaling six hours in wood frame construction cover print reading, nomenclature of building components, stair design, use of the framing square and other carpentry tools, and tool accountability at a project site.

During the same timeframe, students also receive instruction in engineer management. They learn how to conduct a site investigation at a proposed construction site; how to develop a critical path method (CPM) network with corresponding early start schedules; how to use TM 5-333, Construction Management, for estimating crew sizes and durations; how to prepare activity estimate sheets in conjunction with material take-off lists and BOMs; and how to develop resource constrained CPMs.

After completion of these individual classes, a comprehensive integrated construction exercise is conducted which requires students to utilize the skills they have learned in the classroom. The platoon is once again split into small groups and given a construction directive to plan and construct a 16x24 Theater of Operations bath house, utilizing prefabricated plywood panel construction. A CPM, resource constrained to an 11-man squad, is required of each group, as are activity estimate sheets for installing the plumbing and electrical systems along with two other activities. Each group must present their plan at a preconstruction conference in which instructors represent battalion S-3 and Facilities Engineer personnel. Group presentations include layout of the site, impact of the constrained CPM, safety and tool accountability plan for the project, how VIP visitors will be handled, material requisition and storage plans, and support required from other units.

An 18-hour practical exercise follows in which the student officers actually construct the building and install the plumbing and electrical system. The small groups are combined once again to form a squad size element. Each squad has its own building. The squad leader is pretty much left on his own and allowed to make mistakes that do not materially affect the structure or delay progress. For example, if a squad forgets to order an item on its BOM, the instructors might require that squad wait 30 minutes before the item is issued, emphasizing the importance of having a complete BOM. Throughout the construction, leadership skills are closely monitored and critiqued. Leadership positions are rotated at various phases of the construction. Use of the CPM at the project site is stressed.

Sometime during the project, each squad is visited by a VIP. It might be the battalion commander, the Facilities Engineer, or even the unit chaplain. The project leader must alter his briefing to match the interests of the VIP. This has been noted as an area where second lieutenants are initially very weak and may require additional training once they get to the field.

Each squad is required to construct a truss, set of stairs, wall panel, etc., as time permits. Thus, the student receives good introduction to the skills and techniques which enlisted members of his platoon must use as well as the tools that are normally available. Throughout the construction, pointers of "tips-of-the-trade" are given, realizing that such knowledge is normally gained only by experience.

Several inspections are conducted by the instructors, to show students how to conduct an inspection as well as what to look for and how to correct it. Emphasis is placed on discovering the cause of deficiencies so that they may be prevented in the future.

When the second lieutenant reaches the field, he will not be able to perform construction design. He receives only a brief introduction to electrical, plumbing, and wood frame construction in EOBC. He will, however, know how to use a CPM to organize and prepare for a construction project. He should be able to do BOMs and read construction prints. He should be able to conduct an on-site inspection and direct corrective action for deficiencies discovered. Commanders, however, must remember that a second lieutenant's exposure to construction tasks is very limited. He must receive extensive on-the-job training at his first permanent duty station.

Maj. Lester C. Roth is presently assigned as Chief, Structures and Utilities Branch, USAES. He has served with the 307th Engineer Battalion at Fort Bragg, NC and the 2nd Engineer Battalion, Korea.

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The Earthmoving Platoon in Tank Ditch Operations

by Capt. Michael L. Hoots

"A balanced US tank and mechanized infantry company team of 12 tanks and 12 armored personnel carriers, occupying a battle position in the active defense, may confront a first echelon array of some 90 to 100 armored vehicles. To defeat such a formation, first slow the attacker's momentum; that provides time to kill his tanks and infantry fighting vehicles."

—TRADOC Bulletin No. 12
Battle Report Terrain Reinforcement:
Tank Ditches
28 March 1980

The effectiveness of properly constructed and well positioned antitank ditches has been well documented. The Corps combat heavy engineer battalion concentrates a tremendous amount of terrain reshaping equipment in the earthmoving platoons of each of its three line companies. These three platoons can project enough combat engineering power to alter the course of battle if they are properly and efficiently employed.

In August and September of 1980, the 548th Engineer Battalion (Combat) (Heavy) conducted tests to determine

the most effective employment of earthmoving platoons in tank ditch operations, and to determine the most effective construction techniques utilizing current TO&E equipment. The tests were conducted at the 548th's home station, Fort Bragg, NC.

Each combat heavy earthmoving (EM) platoon has three D8K bulldozers, four 290M wheeled tractors with 18 CY scrapers, and one 5 CY scooploader.

Company B of the 548th was selected to conduct the actual tank ditch field testing and to complete the planning and coordination of all other phases of the operation. The platoon leader and platoon sergeant were confronted with the following very probable battlefield missions:

- Organize the platoon in such a manner as to effectively construct as many ditches simultaneously as possible;
- Determine the most efficient method of construction for each "team" organized.

The keys to organizing the independent teams were rates of construction and overall efficiency, reliability, and flexibility. The most effective team envisioned consisted of two D8K bulldozers using the push/strike-off method of construction. The D8K bulldozer is well known for its all-weather capability, maneuverability, and ease and reliability of maintenance.

The least reliable team envisioned would have consisted of all 290M tractors or tractor/pans (three scraping, one pushing). Even under the control of an experienced operator, the 290M is difficult to operate in unstable soil conditions. The reliability of the 290M tractor as a pusher is also highly suspect. A recent construction project by Company B at Carrboro, NC, confirmred the weak pusher ability of tandem 290M teams in anything but ideal weather and soil conditions. Also, because of the age of the equipment and its unique design within the construction equipment community, a consistently good operational readiness posture is often difficult to maintain.

When actual construction techniques were analyzed, the simplicity and overall superiority of the double D8K bulldozer team was obvious. The push/strike-off method is a two-step continuous process. It can be continued indefinitely, and cycle times are negligible. A team consisting of all 290M tractor/scrapers constructing a U-shaped ditch might be fairly efficient in the beginning, but it would eventually lose efficiency through excessive cycle times as the ditch lengthened. A constant rate of construction could be maintained if the 290M tractor/scrapers built the ditch in segments, but "dead spaces" in the overall ditch pattern would result.

The solution was a team of one bulldozer and one tractor/scraper constructing a U-shaped ditch. The 290M tractor/scrapers would provide the ditch-digging impetus. The bulldozer would ensure a reliable pusher capability, and would also perform a unique function to ensure a constant rate of construction.

The bulldozers would dig entry slots into the enemy side of the ditch at predetermined intervals. Then the 290Ms could enter the ditch and continue construction at a constant rate. If the time for slot construction could be minimized, an efficient rate of construction could be maintained. It meant sacrificing a highly efficient D8K bulldozer team, but it was hoped that increased team reliability and flexibility would be gained.

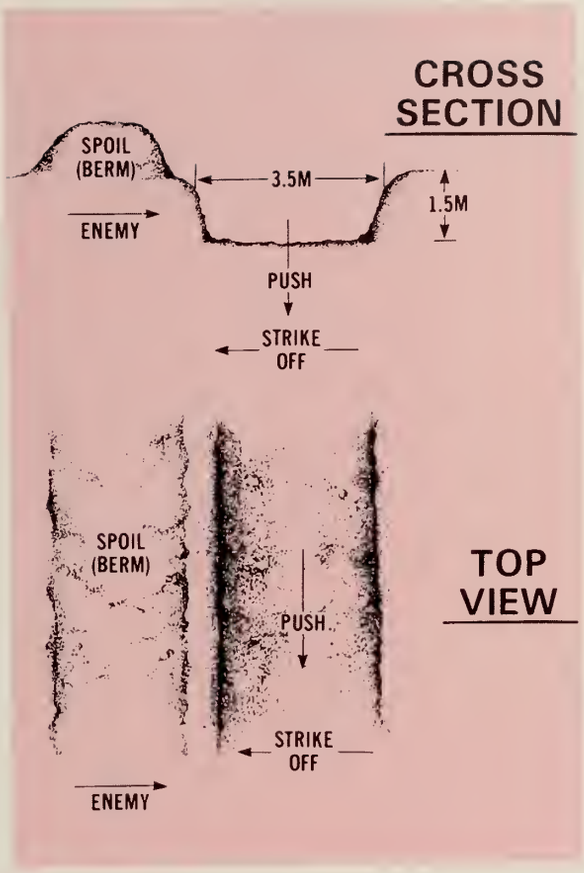


Figure 1

The platoon's scooploader and a borrowed D8K bulldozer would both be used in the push/strike-off method (using a D8K pusher) to gain a comparison of each machine's capabilities in the strike-off phase of construction. No great difference in efficiency was envisioned for this relatively non-taxing portion of the ditching process.

Testing concluded that three teams could be effectively deployed by the one D8K bulldozer. Team 3 consisted of one scooploader and one bulldozer. These teams were designed for maximum utilization of indiginous EM platoon equipment and were tailored for effective mission accomplishment.

The ground over which construction was planned for the scraper/dozer team included flat to gently rolling terrain. This made the erection of a high, spoil berm incompatible with the use of direct fire, antitank weapons such as TOWs, Dragons and tanks.

Terrain conditions for the loader/dozer team were

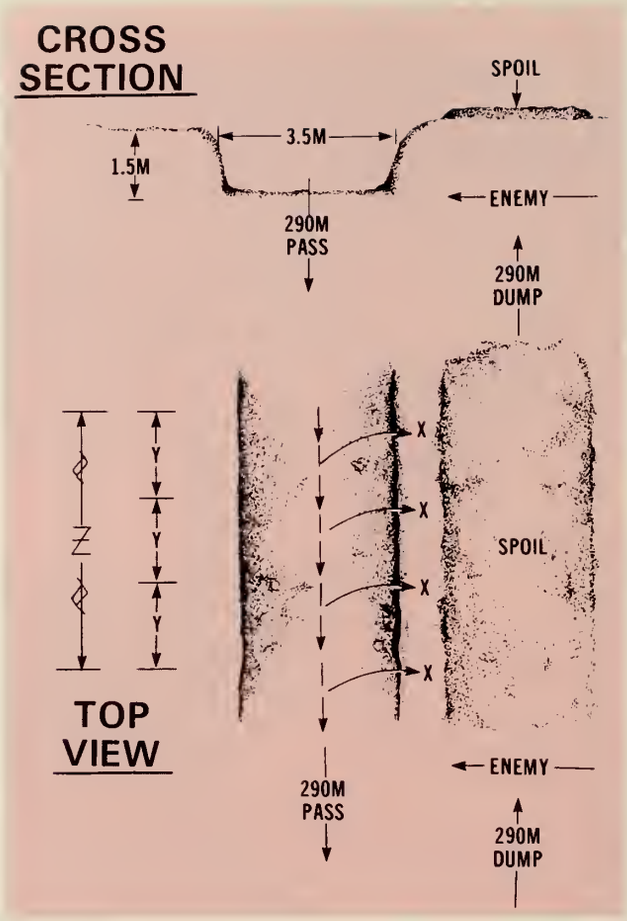


Figure 2

assumed to be broad and steeply rolling, ideally suited for a high berm. The soil was analyzed to be 70 to 75 percent sand and the remainder clay and fines.

Considering the equipment available and the relative effectiveness of each ditch design (U-shape, triangular, and side-hill cut), the U-shaped ditch was selected for construction. The loader/dozer team would build a U-shaped ditch using the push/strike-off method. This two-step, continuous process ditch has proven to be the quickest to construct and the hardest to cross. The plan called for substituting an additional D8K bulldozer (probably from the maintenance and equipment support company) for the 175B scooploader in the strike-off phase of construction. The loader could then be employed to dig road craters in the shape of small triangular antitank ditches elsewhere in the defensive sector.

The straightforward approach of the push/strike-off method resulted in few unexpected findings. It is worth noting, however, that the relatively simple method of construction was not so simply transmitted to even experienced operators. More than an hour of carefully supervised practice was required for operators to achieve an efficient construction rythmn. (Figure 1). The final product was effective in accomplishing the mission.

The rate of construction for the bulldozer/bulldozer team was measured approximately 140 meters per hour in all terrain conditions. This result was surprising, as only 100 meters per hour had been anticipated.

The construction method for the scraper/dozer team was also relatively simple in concept, but proved to be complex in execution. The 290M scrapers were to make a digging pass, accompanied by a push dozer. At the end of the digging run, the dozers were to make a dumping run to distribute the spoil on the friendly side of the ditch. The dozer would then return to the beginning to rejoin the scrapers. (Figure 2).

The tests revealed that the tractor/scrapers began to seriously outcycle the dozers at approximately 100 meters of construction, depending on terrain conditions (rolling versus flat). Therefore, a decision was made that scraper entry slots would be constructed about every 100 meters of ditch. The decision was based on the following criteria:

- Efficient cycle distance was determined to be approximately 100 meters;
- When backing up, the D8K dozer begins to lose final drive lubrication at approximately 120 meters.

After considerable practice, a slot construction time of about five minutes was obtained. Ironically, an overall rate of construction of 100 meters per hour was obtained after operators and supervisors gained proficiency with the technique.

It was also observed that the tractor/scrapers were more efficient when operated in tandem with the push dozer, rather than independently of the dozer. Coordination between operators was difficult at first, but proper supervision resolved the problem. Ensuring efficient cycle times and distances was essential to the success of the operation.

All that remained to be done was to compare the effectiveness of the D8K dozer, the 175B scoopleader and the 290M bobtail tractor in the strike-off phase of the two-step, continuous process ditch technique.

The rate of construction using the 175B loader in the strike-off phase was disappointing. A maximum rate of only 90 meters per hour was obtained. A lack of firm traction and the absence of a clam shell bucket were chiefly responsible for the slow rate. Using the 290M bobtail in the strike-off phase yielded a construction rate of approximately 110 meters per hour. The lack of traction was again the reason for the relative inefficiency. The obvious conclusion was that there is no substitute for a heavy duty blade and a tracked vehicle with deep grousers.

A summary of the test results follows:

- two D8K dozers: 140 meters per hour
- one D8K dozer and one 290M tractor/scraper: 110 meters per hour
- one D8K dozer and two 290M tractor/pans: 100 meters per hour
- one D8K dozer and one 175B loader: 90 meters per hour

Again, a team of three 290M tractor/pans and one tractor pusher was not considered because of its inability to sustain a constant rate of construction, traction and maneuverability problems, and low level of maintenance reliability.

Various indigenous platoon vehicle combinations yielded two best aggregate construction rates:

- two teams of two 290M tractor/pans and one D8K dozer and one 175B scooploader: 290 meters per hour
- three teams of three D8K dozers and three 290M bobtail tractors: 330 meters per hour.

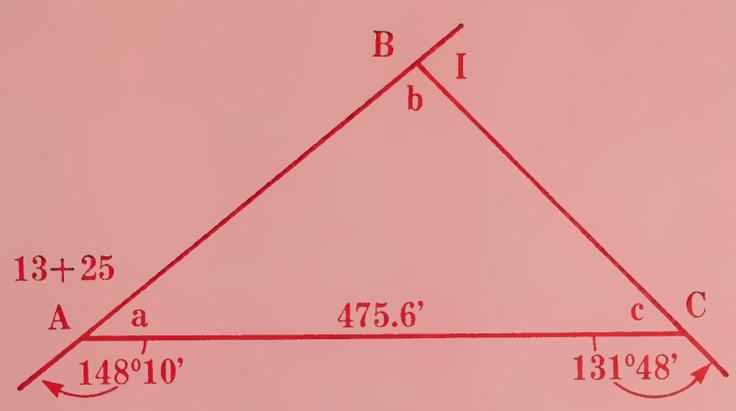
Again, there is no substitute for big blades and grousers. A bulldozer obtained from an outside source would definitely change the platoon's team configurations. Any possibility of creating a team of two bulldozers without sacrificing overall platoon flexibility or efficiency must be eagerly exploited. The addition of only one bulldozer can mean a gain in the platoon rate of construction of almost 20 percent. It is important to realize, of course, that individual test results will vary with soil conditions, operator efficiency, terrain and weather characteristics, and supervisor competence.

The most significant lesson learned by the tests was that there is no substitute for hands-on training in tank ditch construction. Even simple techniques such as the push/strike-off method require training time and effort. Intangibles such as team organization, operator proficiency and supervisor knowledge cannot be adequately tested in a classroom environment. The perfect classroom is the terrain and the best teacher is experience.

Capt. Michael L. Hoots currently commands Company B, 548th Engineer Battalion Fort Bragg, North Carolina.

THE PROFESSIONAL ENGINEER PROBLEM

The Professional Engineer Problem below is presented courtesy of the Fort Belvoir Chapter of the Society of American Military Engineers. The P.E. Problem is designed to provide study and stimulus for engineers aspiring towards Professional Engineer Registration, and to act as a review for currently licensed engineers. The Engineer School Problem will resume next issue, along with a new Professional Engineer Problem. Questions or suggestions regarding Professional Engineer Problems should be addressed to ENGINEER MAGAZINE, ATTN: Society of American Military Engineers P.E. Problems, Public Affairs Office, Fort Belvoir, VA 22060.



Two highways intersect at point "B", as shown above. Line AC is 475.6 feet long, originating at Station 13 + 25. A nine degree curve is planned to join the two highways. Compute the following: Station of PC, PI, & PT; Angle of Intersection; Radius; Tangent; Length of Curve.

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BRIDGE DEMOLITIONS IN THE FACE OF THE ENEMY

by Major Allan E. Younger, Royal Engineers, British Army

The following article taken from the MILITARY REVIEW, Command and General Staff College, Fort Leavenworth, Kansas, Volume XXXIII, No. 4, July 1953, is reprinted to furnish background information and to illustrate one of the more important of the countless problems facing military engineers on a division level and below in the employment of obstacles.

This article was prompted by an earlier one entitled "Who Dictates Destruction?" by Lieutenant Colonel Harold I. St. Clair, which appeared in the October 1952 issue of the MILITARY REVIEW.

There is one aspect of the German failure at Remagen, however, which Colonel St. Clair did not emphasize. He stated that there had been no prepared demolition plan at the bridge and this surely was the key to failure. It is not with the desire to criticize his article that this has been written, but rather to investigate the type of orders, that if given to the Remagen bridge demolition commander, would have ensured destruction of the bridge or at least saved him from execution later!

As Colonel St. Clair correctly stated, we are likely to have to fight a retrograde action in the initial stages of a future war. Men's lives will depend on the thoroughness of their training and the exactitude of their thought before this test comes. Therefore, we must ensure that the complexities and uncertainties of this type of warfare do not result in a "Remagen" by careful and detailed planning and through execution of all operations during a retrograde movement.

From a purely engineer viewpoint, the main problem in demolition remains as it always has been, "What shall I do if the enemy arrives on my bridge and I cannot get in touch with the superior officer who is authorized to order to fire?"

The reason that this question is so difficult to answer is that there are so many variables involved. These are:

1. The circumstances of the appearance of the enemy at the bridge and of their strength.
2. The strength of our own troops cut off on the far bank.
3. The strength of our troops in close proximity to the bridge.
4. The relative air situation.
5. The time factor, including the efficiency of communications.
6. The importance of the bridge.

To illustrate these, let the reader decide whether he would order the demolition if he were a sergeant faced with this situation and able to blow a bridge but lacking any superior orders.

You are a German sergeant at the Remagen bridge. You have been told that at least three divisions of German troops are on the far bank. Suddenly a group of the enemy, you estimate a platoon, which is about the same strength which is available to you, appears at the bridge. Will you fire the demolition? Obviously, the answer is no. Alter this situation to an enemy armored division arriving at a less important bridge, with one battalion of your own on the far bank. Will you fire this time? Obviously, yes.

However, there are many situations between these two extremes where the answer is not so simple and in these

instances remember that all the variables have not been included. The problem, therefore, is how to obtain the maximum chance of ensuring success when faced with so many variables and above all with the uncertainties of battle, particularly the lack of information so aptly called "the fog of war."

THE HUMAN ELEMENT

Another factor in bridge demolition is often forgotten by staff officers, namely, that of the strain on the engineer responsible for the demolition. It is doubtful whether any other single situation in war implies such a strain on a junior officer or noncommissioned officer as the demolition of a bridge in the face of the enemy. The reason for this is that no man can ever be completely certain that a large and complicated demoliton will be successful. A chance bullet or mortar shell may have cut his leads, a well directed bomb is almost certain too. There is always a danger of premature demoliton from similar causes, particularly when blasting caps have been inserted. Above all, no one on earth can give him an exact time for blowing, so he must be on the alert continuously. At the back of his mind may loom the potential penalties for failure. The physical relief that he feels if the demolition eventually succeeds is comparable with that felt by the airborne soldier when his parachute opens. Also it must be borne in mind that no country, however rich, is likely to be able to provide bridges for practice demolitions by newly commissioned officers or by noncommissioned officers.

This all points to the importance of the orders to the engineer firing part being really accurate, comprehensive, and realistic. A junior officer bearing such technical responsibility and subjected to such mental strain must be protected as far as possible from the chance of having to make decisions of great consequence.

IMPORTANCE OF COMMUNICATIONS

If communications are adequate, there is little problem. A liaison officer in good contact with his headquarters can obtain a ruling on any eventuality; however, dare one rely on radio in these circumstances? During the Rhine crossing, the leading wave of LVTs on one sector was about to enter the water when an officer ran up to the commander of the wave: "There has been a slight change of plan," he said, "The artillery will not lift on a time basis, but when you give the code word "splash" over the radio."

Seconds later, the wave set off. As it did so, someone chose to send out a signal, successfully jamming the radio net. Helplessly the commander yelled "Splash, I say again, Splash," into his microphone, receiving no reply. Inevitably the first wave drove into our own barrage.

This example is only introduced as being typical of circumstances all users of radio have experienced. It is suggested that to rely on radio as being the answer is courting failure by not eliminating one of the variables of the problem. Everything possible must be done so that the commander at the bridge site has no need to fall back on the outside advice unless totally unforeseen circumstances arise. This indicates a need for written orders at the bridge.

SEQUENCE OF EVENTS

Disregarding any type of demolition not being fired or likely to be fired in the face of the enemy, let us run through a typical set of circumstances to clear the problem in our minds.

A division commander wishes to convert a river into a complete obstacle and withdraw behind it. He, therefore, orders his engineer to prepare the bridge for demolition in advance. The front line may be 10 miles beyond the river and the loss of the bridges of this stage is unlikely. If they are lost, say to unexpected airborne attack, the commander will fight to regain them. At this stage, the sensitive blasting caps should not be inserted into the demolition circuits on the bridge for there is little question of destruction. To avoid the chance of error, the engineer at the site should be given written orders not to fire. This will not prevent an officer senior to him from giving him contrary orders, but it does protect him if he insists on a written authority from this senior officer and he will obviously attempt to check with his divisional headquarters first, if it is possible.

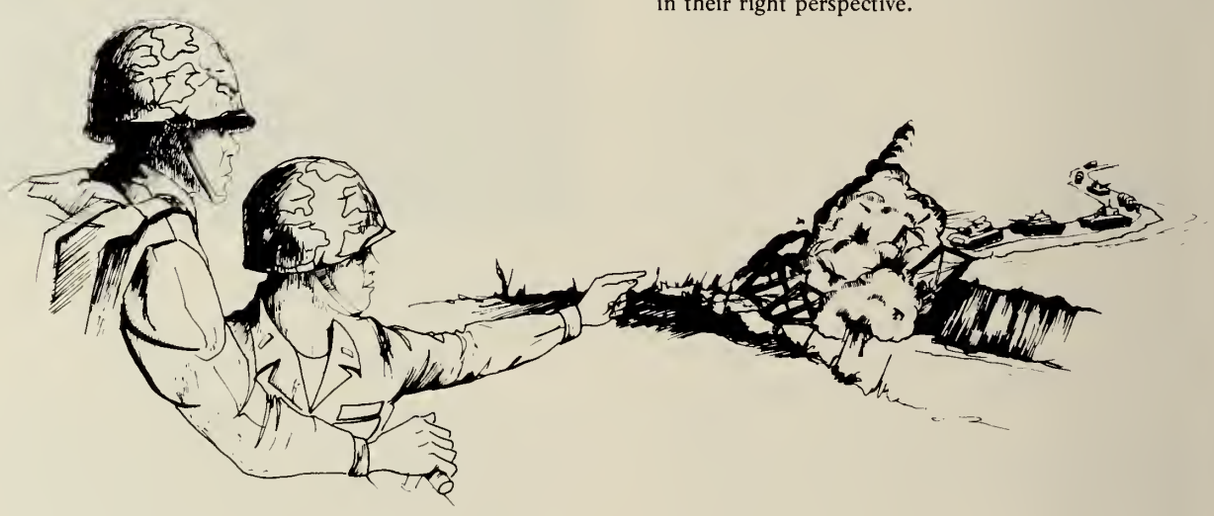
If the bridge is important, the division commander normally will send a unit to protect it. The demolition team should be integrated into this unit so that the whole becomes the bridge garrison. The bridge garrison commander (demoliton guard commander), probably an infantry officer, is now the final link between the division commander and the demolition team leader (firing party commander), on the site.

What the engineer at the site now requires is a check

list to tell his new commander the technicalities, such as the time required for inserting blasting caps, and to remind him of the extra danger of premature explosion when such caps have been inserted.

At this stage, the engineer also must be quite sure that all his men know how to fire the demolition in an emergency, and also that a seniority roll is prepared so that there will be no confusion if there are casualties. Similarly, the bridge garrison commander must be in close contact with the engineer and must plan to avoid confusion if he becomes a casualty.

Normally, communications can be assumed to operate, and the division commander can always order the destruction of the bridge. Obviously, he needs to appreciate two situations to give this order, namely the situation at the bridge and the wider situation over the entire front. To keep him in touch with events at the bridge site, and to provide him with a quick alternative means of passing the orders to fire, the division commander may station a liaison officer there, in radio contact with him at his command post.



DELEGATION OF AUTHORITY

As the bulk of the covering troops withdraw over the bridge, or as the local tactical situation changes, the firing of the demolition may cease to be a vital divisional problem. At this stage the division commander will frequently delegate authority to blow the bridge to a regimental commander, who may in turn delegate it lower. This raises no problem except that there must be no doubt in the mind of the commander concerned that he is responsible for the giving of the order. Moreover, the bridge garrison commander must be in no doubt about from whom he will receive his orders. This may be elementary, but it is the very delegation of authority too early or too late that causes failure.

UNFORESEEN ENEMY ACTION

The whole difficulty of demoliton orders can be summed up in the need for the junior regimental officer to know accurately the "big picture." This is an oversimplification, but it can be seen that if the division commander set up his command post at the bridge site with all the communications at his command, and kept it there until the demoliton was complete, there would be little difficulty. There would, however, be a great waste of the division staff in the process.

Therefore, the man at the site must be kept in the picture, in the same way that he is responsible for keeping his superior informed of events occurring near him. If this has been conscientiously done there should be little danger of the wrong decision being taken in an emergency. If the enemy arrives unexpectedly and cuts off the garrison, the senior officer on the spot will take charge. If he knows the outside situation he should have little difficulty in meeting his responsibilities.

One human weakness must always be borne in mind. The jobs of both the bridge garrison commander and the engineer are complete when the bridge is demolished. Furthermore, the sooner it is demolished the greater the chance of a technical success. Therefore, there is an understandable tendency on the part of both parties on the site to interpret events in such a way as to favor early demolition. Here, the presence of the division commander's liaison officer may help to keep events viewed in their right perspective.

CONCLUSION

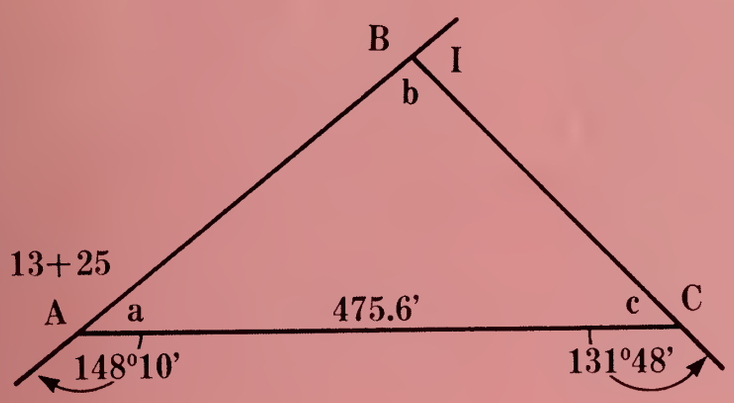
The lesson of history is that where in battle there is uncertainty and a paramount need for determination and clear thinking, success depends, above all, on clear-cut command. There are many instances of demolition failures in battle because of lack of precise orders.

Most often, in the past, the trouble has arisen through confusion as to the officer empowered to give the order. It is contended, therefore, that the chances of success depend primarily on absolute insistence on a recognized drill which must include:

1. Definite specification in writing by appointment and name of the officer authorized to order demolition.
2. Clear written instructions to the engineer officer or noncommissioned officer leading the demolition team regarding technical aspects of the demolition.
3. The possession by the demolition leader of a checklist to cover the engineer responsibility in various eventualities.

This precision is all the more necessary in modern war in the face of possibilities of attack by air or armor.

The Professional Solution



SOLUTION: $a = 180° - 148°10' = 31°50'$
$c = 180° - 131°48' = 48°12'$
$b = 180° - (31°50' + 48°12') =$
$99°58'$ or $99.97°$

Angle of Intersection: $I = 180° - 99°58' =$
$80°02'$ or $80.03°$

Radius: $R = \frac{5729.58}{D} = \frac{5729.58}{9} = 636.62$ feet

Tangent: $T = R \tan I/2 = 636.62' \tan 40°01' =$
$534.51'$

Length of Curve: $L = 100\ (I/D) = 100\frac{(80.03)}{9}$
$= 889.26$ feet

Determine AB: $\frac{AB}{\sin c} = \frac{AC}{\sin b}$
$AB = (475.6)\ \frac{\sin 48°12'}{\sin 99°58'} =$
$(475.6)\ \frac{.745}{.985} = 359.72$ feet

Station of PI: $PI = Sta\ A + AB = (13 + 25) +$
$(3 + 59.72) = 16 + 84.72$

Station of PC: $PC = PI - T = (16 + 84.72) -$
$(5 + 34.51) = 11 + 50.21$

Station of PT: $PT = PC + L = (11 + 50.21) +$
$(8 + 89.26) = 20 + 39.47$

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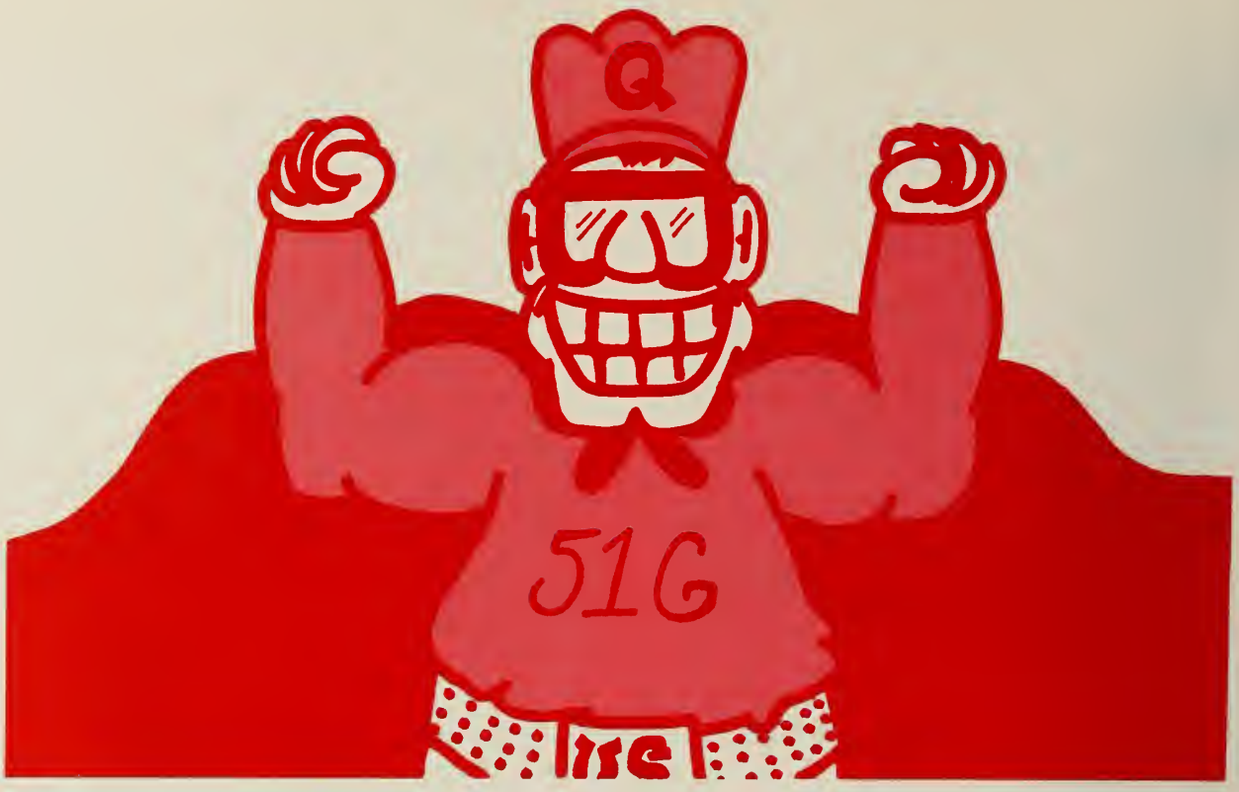

If It's Quality You Want...

by Capt. Thomas B. Nelson

Quality control of materials used in construction cannot be over emphasized. The end product is a direct result of the materials used. The best design and the most energetic supervision cannot build a successful road or airfield if the materials used do not meet specifications. And it is this field of quality control, unfortunately, that often receives only half-hearted attention. In order to ensure this quality we have an asset that we can use; the Material Quality Specialist, MOS 51G.

The stated purpose of the Material Quality Specialist (MQS) is to perform field and laboratory tests on soils and construction materials. The tests on soils, which includes rocks, or geology, are emphasized, because *all* horizontal construction projects are built *on* soil or rock, and *with* soil or rocks.

The specialist, in the rank of E1 through E5, learns the basics of his job in Advanced Individual Training (AIT) at Fort Belvoir, Va. Perfection of his basic skills and the learning of new techniques

are dependent on practice of his skills, completion of correspondence course work and on-the-job training. The success of a construction project often depends on the 51G's training, and associated skill. This article will highlight the 51G's formal training and provide recommendations for his continuing education.

The typical MQS student is an E1, straight from Basic Combat Training. Army students also include National Guard and Reserve Component EM's in the grade of E1 through E5. Most students are high school graduates, and all must have a GM score of 100. The sister services, including the Seabees and Marines, send students in the grade of E5 through E7 for future assignments as instructors or supervisors. Allied countries; notably Canada in recent years, send students in the grades E4 through Warrant Officer, again, usually for future instructor positions. The school welcomes these students and finds that their slightly differing needs and backgrounds add to the classroom training and the class interaction. This diversity is a major factor in promoting the team effort which helps the learning experience.

The Material Quality Specialist Course is taught by instructors of the Roads and Airfields Branch, Department of Military engineering, US Army Engineer School, emphasizing material quality work in support of horizontal construction. The course length is eight weeks, one day, with a total of 324 hours of instruction. The typical academic day includes six hours of class, with the remaining 2 hours being devoted to physical training, studyhalls, or open time. A full 70% of all training is "hands-on", actually working with the equipment and materials. Tests performed and procedures taught conform as closely as practical to those standards set by federal agencies, to include American Association of State Highways and Transportation Officials, (AASHTO) and American Society for Testing & Materials (ASTM).

The course is composed of four subject blocks: geology and drainage, soils, concrete, and bituminous. The soils block is further subdivided into 3 phases: Soils I covers the basic soil properties and tests; Soils II covers compaction and strenght parameters; Soils III covers advanced techniques of stabilization, unconfined compression and soils report writing.

A student checks soil samples in the lab.

The geology and drainage block provides the student with a knowledge of rock types and their origins. Students learn to identify the 18 basic rock types and the rocks' usefulness as a construction material. They then learn how to measure rock orientations in the field and how a particular alignment of bedding planes may affect a project. The location of surficial materials is covered extensively, teaching the student where he can find materials is covered extensively, teaching the student where he can find materials for construction without expensive quarrying/crushing. Ground water, quarrying, and drainage fill the remainder of the block, which is tied together with a field trip to actually apply the knowledge gained.

Basic soil identification and properties tests make up the instruction in the Soils I block. Students learn soil identification by the Unified Soil Classification System and a hasty field method utilizing limited equipment. Atterberg limits, grain size distribution, specific gravity and moisture content, tests which determine the properties of soils, are covered in depth, with students spending most of their time actually performing the tests in the soils laboratory.

Compaction, California Bearing Ration (CBR) testing and field density determination comprise the 54 hours of the Soils II block. Students learn how to determine and test specifications for soil

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MATERIAL QUAL

- SITE SELECTION
  - STRUCTURAL GEOLOGY
  - SURFICIAL GEOLOGY
- EXPLORATION
  - ROCK IDENTIFICATION
  - STRIKE & DIP READINGS
  - FIELD IDENTIFICATION OF SOIL
  - SOIL BORINGS
  - CONE PENETROMETER
- MATERIALS TESTING
  - SIEVE ANALYSIS
  - HYDROMETER ANALYSIS
  - ATTERBERG LIMITS
  - UNIFIED SOIL CLASSIFICATION
  - LABORATORY COMPACTION TESTING
  - CALIFORNIA BEARING RATIO TESTING
    - FIELD CBR (IN PLACE)
    - PLATE BEARING
    - UNCONFINED COMPRESSION
- EARTHWORK INSPECTION
  - MOISTURE CONTENT
    - SPEEDY MOSITURE GAUGE
    - EXPEDIENT METHODS

compaction using the sand cone and the nuclear moisture density gauge.

Training in the nuclear moisture density gauge includes eight hours of instruction ending with a combination written and hands-on exam. The MQS Course is one of two sources of licensing on this equipment. Students passing the test are licensed to operate the gauge. CBR testing and analysis complete this block.

The Soils III block completes the soils instruction, and includes teaching the students exploration, stabilization, unconfined compression testing and technical report writing. During this period of instruction, students perform an actual soils test problem from the exploration phase through submission of a technical report.

The concrete instruction teaches students the properties of concrete, mix design, testing and quality control of concrete projects. Students perform the tests on samples mixed to their specifications.

In the bituminous block students learn indentification of bituminous materials, their uses, mix design by the Marshall Method and testing the quality of bituminous materials. A trip to an asphalt plant and a commercial testing lab highlights this block of instruction.

The successful completion of the course prepares the Material Quality Specialist to assist the S3 and using units in a wide range of projects. His education qualifies him to perform exploration, testing, advising and inspection. The specific capabilities in support of these roles are shown in the accompanying table (table 1).

Although the specialist is qualified to perform these functions, his education is far from complete, and requires the assistance of his supervisors. Perfection of techniques requires practice, so utilization of the 51G in his skill in the field is essential. Too often units complain about poor quality control, while a qualified 51G is being utilized as a jeep driver. The specialist needs to practice his skills as much as an expert marksman needs to hone his shooting skills.

This practice of skills should not be limited to periods when projects are being constructed. During those between-project periods of time the specialist can be performing tests on local borrow

ALIST CAPABILITIES

FIELD DENSITY TESTS
SAND CONE
NUCLEAR DENSOMETER
CORRECTIVE ACTION
BITUMINOUS MATERIALS TESTING
FIELD IDENTIFICATION OF BIT. MATERIALS
MARSHALL STABILITY OF MIX DESIGN
AGGREGATE BLENDING
SURFACE TREATMENTS & PAVING OPERATIONS
PAVING QUALITY CONTROL
CONCRETE MIX
MIX DESIGN—SLUMP TESTS
COMPRESSIVE STRENGTH
MODULUS OF RUPTURE
QUALITY CONTROL
MAINTENANCE
SOIL STABILIZATION
SLOPE STABILITY
CONSTRUCTION ADVISOR
DRAINAGE
SOIL STABILIZATION

pits, compiling a file on the characteristics of all sources of soil available to the particular unit, possibly saving valuable time at the start of a future project. In addition, he can be practicing skills not used on past projects through working in his Soldiers Manual, the guide to what the man must know for future skill progression. The Commanders Manual will give further guidance on how you can help his progression.

You can also help the 51G by employing him as part of a "team" effort. His work is used by a draftsman in putting the numbers on paper, and checked in the field by a surveyor. The 51G should be familiar with their functions to better assist them, and to prepare himself to one day progress to the 51T level, when he will be the supervisor of the three fields (as shown on the career progression scale) (fig 1). While he will learn MQS skills at the Engineer School, the other skills must be learned in the field through experience or correspondence course, if he is to become an effective supervisor.

As an instructor and a developer of the course I have pride and confidence in the graduates of our school. The students have a similar pride in their abilities, if not complete confidence yet. They know they can do their job and want to do it. It is only through utilization of their skills that confidence can be built. As supervisors, use these 51G's, building up their skill levels, their confidence and your quality control on projects. With manpower and construction resources limited, proper employment of the trained specialist can help you get the most for your money.

Capt. Thomas B. Nelson is currently assigned as an instructor in the Roads and Airfields Branch, Department of Military Engineering, U.S. Army Engineer School. At the time this article was written, Nelson was the Officer-in-Charge of the Materials Quality Specialist Course.

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ENLISTED CAREER INFO

BECOME A WARRANT

Warrant Officers aren't grown in cabbage patches, in fact, most were once enlisted soldiers just like you.

The Warrant Officer Procurement Program for FY 1981 is outlined in DA Circular 601-80-1, dated 15 September 80. The circular encourages applications from personnel who are qualified for appointment and entry on active duty as warrant officers. It identifies seven warrant officer candidate training programs designed to produce appointees in MOS 011A, 031A, 100B, 222C, 223B, 224B, and 841A. It also lists opening and closing dates for other MOS and provides instructions on processing the application.

In addition to eligibility and processing criteria given in AR 135-100, there are other regulatory requirements such as:

- Mandatory MOS prerequisites that cite specific military training courses.
- Preferred MOS qualifications that outline job experience, military training and civilian education.
- General qualifications, including length of service, experience, military training, civilian education level, mental capacity, character, and conduct.

In many instances, the mandatory or preferred prerequisites include the requirement to complete resident courses of instruction. In cases where the required training is available through extension or correspondence course, nonresident course completion will satisfy the resident requirement.

Applications for a warrant appointment may be submitted at any time, but around six years of enlisted service is preferred in most cases. An exception to this is aviation. Solidiers who meet the qualifications may apply for the aviation training program without any required time in service.

The number of female warrant officers is just beginning to grow because it was only in 1972 that expansion of women in the Army began. The Army strongly encourages women to apply.

If you're interested in becoming a warrant officer, talk to your personnel officer for details on how to apply.

SQT NOTICE

The Skill Qualification Test (SQT) is a major training diagnostic for the Army individual training system. It provides feedback for trainers to develop effective training programs. Under the provisions of AR 600-200, soldiers/commanders may request SQT administration to support specific personnel management functions such as promotions, reenlistments, EPMS, and the qualitative management program. Primary Military Occupation Specialty (PMOS) testing by SQT is mandatory on an annual basis.

RESERVE OFFICERS' TRAINING CORPS SCHOLARSHIPS

One plus equals three, according to a new formula ROTC has come up with. One year of enlisted active duty plus one year of college could win you a three-year college scholarship. Not bad arithmetic when you consider it adds up to a commission as a second lieutenant.

In addition to the new program, the Army ROTC Scholarship Program still offers two-year scholarships for those who have completed two years of college. Both programs are designed to give enlisted men and women a chance to get both a college degree and a commission as an army officer.

The application period began January 15, and selections will be announced in June, so apply now.

The awards will pay full tuition, books, and certain educational fees, plus provide a subsistence allowance of up to $1,000 a year each year the scholarship is in effect. In addition, winners will be paid for attending ROTC Advanced Camp, normally held during the summer between the junior and senior years of college. Winners may also take advantage of Veterans Administration benefits they would normally be entitled to.

Competition for scholarships is limited to enlisted personnel who have:

- served at least one year on active duty.
- completed one year of college and have three remaining, or,
- not reached their 25th birthday on 30 of the year they are eligible for commissioning.
- been accepted by a college for next fall's enrollment and have a GT score of 115 or higher.
- US citizenship.

Winners may attend any of the colleges and universities offering Army ROTC or one of the more than 500 non-host colleges that have cross-enrollment agreements with a nearby host school. Enlistment in the US Army Reserve is required prior to enrollment in the Army ROTC Advanced Course. Upon successful completion of their military science and baccalaureate degree requirements, these former enlisted personnel will be commissioned as second lieutenants and obligated to serve four years on active duty.

Applications must be requested by April 15 and submitted not later than May 1. For information and applications, contact HQ TRADOC, ATTN: ATRO-CM, Fort Monroe, VA 23651.

The following criteria should be used as guidelines for determining eligibility for annual testing:

- Soldiers must have completed a minimum of 12 months active Federal service as of the date of testing.
- Soldiers must be properly classified in accordance with Chapter Two, AR 600-200, in a PMOS identified in the applicable SQT announcement circular.
- Soldiers in pay grade E4 and below must have held PMOS, regardless of time in grade, a minimum of 90 days immediately prior to testing.
- Soldiers in pay grade E5 and above must have held their PMOS and grade a minimum of 90 days immediately prior to testing.

To qualify as exempt from annual SQT, soldiers must:

- Be participating in a course of instruction which, upon successful completion, qualifies them for advancement to commissioned or warrant officer status.
- Be attending a civilian college or university on a full time basis under the provisions of AR 621-1 or AR 621-7.
- Be attending an MOS producing course or functional schooling.
- Be assigned as a patient to a medical holding unit.
- Be within six months of an approved voluntary retirement date or have requested retirement in lieu of accepting a PCS or reassignment.
- Be confined in a civil or military detention facility to include the US Army Retraining Facility and US Army Personnel Control Facilities.
- Be attending the resident phase of an NCOES Course.
- Be within 90 days of ETS. This exemption applies only to first-term soldiers who have previously verified their current PMOS and grade through SQT.
- Be under an exemption granted by Commander, MILPERCEN.
- Be at a new duty station less than 60 days prior to the scheduled test date.
- Be in receipt of SQT notice less than 60 days prior to scheduled test date.
- Performing duties outside of the PMOS for a period in excess of 90 days under the exception of utilization priorities authorized in paragraph 3-5b (3) and 3-5b (7), AR 600-200.

Soliders may voluntarily request testing while in an exempt status, or prior to the 90 day period after termination in an exempt status. Such voluntary testing can be accomplished during the regular test period. Soldiers missing a scheduled SQT will be rescheduled only upon approval of their commander (0-5 or above).

SERVE FULL-TIME WITH GUARD OR RESERVES

The Army Reserve and National Guard are looking for soldiers to serve the new "Full-time" Manning Program", adopted by the Army in an effort to increase the unit readiness of Army Reserve and National Guard units.

Under the program, soldiers from active components, Reserve, and National Guard units, are assigned to high priority Reserve and Guard units on a full time basis. The full-timers are expected to improve training, mobilization planning, supply, maintenance, and other readiness-related areas.

Soldiers assigned to full-time manning duty are actual unit workers. They live near, work, and deploy with the Reserve or Guard unit to which they are assigned. These units must meet most of the training standards that apply to the Active Army, but only have two days each month and a two-week training period once a year to do so. Full-time manning personnel should make this goal a lot easier to meet.

Junior and midgrade NCO's should check with nearby USAR Centers and Army Recruiting offices about job vacancies.

EARN PROMOTION POINTS

Are you looking for a way to earn promotion points? If so, Army Correspondence Courses may be the answer. If you're in grades E-1 through E-5, you can now earn one promotion point for every five credit hours you complete. There are three ways to study, individually, as a group, or on-the-job.

The inidividual study program lets you decide which courses or subcourses fit your needs, career objectives, or plans for self-development. Group study gives you the opportunity to draw from the resources and experiences of others. Supervised on-the-job training offers "hands on" learning.

The courses, offered through the Army institute for Professional Development, are divided into professional development, skill progression and functional, and individual subcourse categories.

When you have satisfactorily completed a course or subcourse you will get a certificate of completion. A copy of the certificate is forwarded to your official personnel file, however, you are responsible for making sure it gets there. You must have it to get those promotion points. Army Correspondence Courses are accredited by the National Home Study Council.

Check out the courses available to you by talking to a counselor at your education center.

OFFICER CAREER INFO

PROMOTION CHANGES

On 12 Dec 80 the President signed into law the Defense Officer Personnel Management Act (DOPMA) with an effective date of 15 Sep 81.

The transition provisions of Defense Officer Personnel Management Act provide that all Colonel and below Regular Army officers serving in a temporary grade higher than their current Regular Army grade will be promoted to the Regular Army grade which is the same as their temporary grade on the Defense Officer Personnel Management Act effective date. This provision does not apply to officers currently considered as having once or twice failed selection for promotion to the grades of CPT, MAJ, and LTC Regular Army.

Officers in a twice nonselected for Regular Army promotion status to the grades CPT, MAJ, and LTC will be retired, discharged or continued on active duty (e.g. officers within the 18 year sanctuary) until eligible to retire, under current law.

Officers in a once nonselected for Regular Army promotion status to the grades CPT, MAJ, and LTC must be considered for promotion by a selection board. The Army Promotion List and Chaplain Selection board to be convened under this provision is scheduled for 6-16 Oct 1981 with the AMEDD Board scheduled for 19-23 Oct 1981. Officers selected by these boards will be promoted. Officers not recommended shall, unless under new Defense Officer Personnel Management Act provisions be selectively continued on active duty, be retired, discharged or continued on active duty (18 year sanctuary) until eligible to retire, under current law.

The Defense Officer Personnel Management Act provisions described above eliminated the requirement to convene COL, LTC, MAJ, and CPT Regular Army promotion boards in 1981: therefore, the previously announced 1981 schedule of Regular Army promotion boards is cancelled.

Officers on Regular Army promotion lists as a result of 1980 selection boards will continue to be promoted under current law until 15 Sep 81 at which time the Defense Officer Personnel Management Act provisions described in paragraph 2 become effective.

VETERANS PREFERENCE

Veterans preference for certain high-ranking military officer retirees has come to an end.

Effective October 1, 1980, retired members of the armed forces (1) who are not disabled verterans and (2) who retired at or above the rank of major or lieutenant commander are no longer eligible for veterans preference in competitive examinations and appointments.

The change is contained in the Civil Service Reform Act of 1978.

However, disabled veterans and veterans who retired below the rank of major or lieutenant commander will continue to receive veterans preference.

The decision to discontinue veterans preference for highranking, nondisabled veterans is based on the grounds that they are fully equipped to compete for Federal jobs on an equal footing with the civilian population.

ASSIGNMENT ALERTS

In a major policy change effective 1 December 1980, commanders and supervisors have been given an expanded role in the personnel management of their subordinates. Unit commanders and supervisors now play an integral role in informing their subordinate officers of forthcoming reassignments.

The new assignment notification procedure applies to all warrant officers and commissioned officers through the rank of major (O-4). Only officers stationed in the continental United States (CONUS) are involved initially. Plans to include officers stationed overseas are still under study.

The policy change was recommended by MILPERCEN action officers following tests conducted between February and May 1980 involving units at Forts Riley, Benning, and Meade. The new procedure includes the coordination of assignment information—location, specialty, reporting date—between the officer, his commander/supervisor and the MILPERCEN assignment officer.

Under the old system, the MILPERCEN assignment officer called the officer at his home or unit and alerted him of the proposed move. Now, officers are informed by their commanders or supervisors, thus providing them with an opportunity to initially discuss the reassignment with someone other than their MILPERCEN assignment officer.

Additionally, the senior officer/supervisor is immediately aware of the possible loss of a subordinate officer.

Assignment officers now call a designated point of contact at each post or installation—usually within the G-1 office of the Directorate for Personnel and Community Activities (DPCA)—and inform him/her of the officers scheduled for permanent change of station moves. The point of contact is provided with the name of each officer, his Social Security number, the date being considered, the utilization specialty, the location, and the name and telephone number of the MILPERCEN assignment officer involved.

This information is provided to the appropriate commander or supervisor, who makes the initial announcement to the subject officer. If the commander/supervisor elects to do so, he may call the assignment officer prior to, during, or after the counseling period for further information. The announcement is expected to be made to the officer within three working days after the installation point of contact has been alerted.

Assignment officers are prepared to discuss with the commander/supervisor and/or the officer, the assignment rationale, professional development requirements, and the needs of the Army. The officer's performance information is not made available to commanders/supervisors unless the individual officer gives approval to release that information.

If the MILPERCEN assignment officer doesn't hear from either the commander/supervisor or the subject officer within three days, he prepares a request for orders and completes the reassignment process.

201 FILES CHANGING

Officer Field 201 Files will be undergoing some changes in the next year, because of the implementation of the new AR-640-10 which became effective 1 March 81. The regulation, which will be phased in over the next year, classifies many documents now in the 201 File as "excess". Your AG Records Section should be able to give you local advice on what will be pulled, when, and how they will return these "excess" documents to you.

OFFICER PERSONNEL RECORDS

The Officer Personnel Records Division is responsible for the maintenance of the Official Military Personnel File (OMPF) for all active duty commissioned and warrant officers, and the administration of the Officer Evaluation Reporting System. Major functions of this division include:

- Initiate, update, amend, and transfer officer OMPF's.
- Provide records to the DA Secretariat to be used by Selection Boards.
- Receive, review, and place on file Officer Evaluation Reports.
- Administer the Officer Evaluation Report appeals systems.
- Loan OMPF's to authorized users.

Officers desiring to review their OMPF may obtain a copy free of charge by writing Commander, MILPERCEN, ATTN: DAPC-PORRS, 200 Stovall Street, Alexandria, VA 22332. Requests must include the officer's Social Security number. Officers anticipating a visit to the Washington area may also review their OMPF at MILPERCEN by calling Autovon 221-9618/9619 or Commercial (202-) 325-9612/9613. A minimum of two days advance notice is requested.

Officers visiting MILPERCEN to review their Official Military Personnel File are now also provided assistance to update their Officer Record Briefs (ORB's). The new service is part of MILPERCEN's effort to provide "one stop" personnel records service for officers visiting the Alexandria, VA center.

To insure that ORB information is accurate, officers should communicate first with their local MILPO to update the information and not wait until they visit MILPERCEN.

UPDATE YOUR PHOTO

What does your photograph in your Military Personnel File say about you? Are you well dressed? Does your uniform fit? Are you represented as an officer who is ready for added challenges? Your official photograph should represent you at your very best. Don't wear "special" items such as jump boots, unauthorized tabs, ribbons, berets, etc. when having your photo taken. Avoid wearing photo-sensitive glasses which tend to look like sunglasses when placed on microfiche. If your latest photo is outdated, or if you appear overweight, if may be doing you an injustice. Remember that AR 640-30 requires a new photo of every officer every three years.

RESERVE COMPONENTS

GUARD UNIT WINS AWARD

Company A of the 1249 Engineer Battalion, Oregon National Guard, was recently awarded the Governor's Unit Citation for its outstanding contribution to the community and state, in connection with their involvement in the refurbishment of a local community park.

The Guard unit expended nearly 7,000 man hours of work transforming a densely vegetated and rarely used area into a community park. The unit became involved through the persistance of a local resident, John Topits, who decided he wanted to see the area become a place of enjoyment for his neighbors.

The 110-acre Empire Lakes Park was once the municipal water supply for the city of Empire, Oregon, but after World War II the lakes were dropped from the system and designated as a public park. The area was all but forgotten when Topits contacted the Coos Bay City Council and the 1249th Engineers to see if the area could be renovated.

The Guardsmen reconstructed a deteriorating dirt dam, and built a swim/picnic area on the lower lake. An access road was surveyed and constructed, and tons of mud was removed from the lake botton. Sand was brought in to create a beach, and three and a half miles of hiking/biking/nature trails were constructed.

INGENUITY PAYS

What do you do if you need a piece of equipment that's not available? Build it, say Privates Michael Sapiano and Thomas Miller.

Sapiano and Miller, 442d Engineer Detachment refrigeration specialists, built a vacuum pump for refrigeration maintenance by scrounging used parts. Starting with an old refrigerator compressor, electric outlet cord, and a switch box from an electrician's shop, they added an electrical starting relay and drain tube. The soliders mounted their completed project on a wooden frame three and a half days later.

The vacuum pump is used to flush contaminated freon from refrigerators, freezers, or airconditioners, so that new refrigerant may replace the old. A new pump would cost about $650.

ALASKA'S OWN...AND ONLY

Second Lieutenant Walter Wood enlarges an artillery firing pad at Fort Richardson, Alaska during a recent training exercise held there. Wood is a member of Alaska's only Army Reserve unit, the 813th Engineer Battalion. In addition to enlarging this range, the reservists practiced communications techniques and constructed a portable utility shed. (US Army Photo by Dana Jacson).

OREGON GUARD GETS INVOLVED

Specialist Four C.J. Burns of Detachment 1, Company B, 1249th Engineer Battalion, Oregon National Guard, has a good idea. He wanted to get local youths more involved with their community, and with the Guard, so he spoke to his Company Commander about setting up a visiting program.

Burns, a truant officer for Polk County School District, began his project with students from Dallas Junior and Senior High Schools. The visiting program is set up to accommodate up to 10 youngsters per drill weekend. Members of the unit demonstrate some engineer skills, and teach the students how to perform simpler tasks.

So far, visiting students have helped the engineers repair a bathhouse and construct bleachers for an area baseball field. The youths are closely supervised, and parents are invited to speak with Burns or Company Commander 1st Lt. George D. Lanning for an explanation of the program, prior to children attending actual drills.

Burns said community and parental feedback has been "just great" so far. Those attending are presented an Honorary Guardsmen for A Day certificate.

ROTC ENROLLMENT INCREASES

The Army's Senior Reserve Officer's Training Corps (ROTC) has registered its seventh consecutive year of significantly increased enrollment, counting 69,663 college men and women this year.

One reason for this increase might be the Simultaneous Membership Program (SMP). SMP allows membership in the Guard or Reserves, and ROTC, at the same time. This means nonscholarship Advanced Course cadets who enlist in the Reserve Components can draw drill pay as an E-5 and simultaneously draw an ROTC living allowance of $100 per month.

SMP has been in effect for more than a year, and there are approximately 4,000 cadets participating.

Another program boosting ROTC enrollement is called Expand the Base (ETB). In an effort to make ROTC available to more students, 41 new extension centers opened last year under ETB, and 48 more are expected to open this school year. In addition, eight new host schools are scheduled to open next year. Also, Congress recently approved an increase of 5,000 scholarships, bringing the total awards available through Army ROTC to 12,000.

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"ENGINEER MAGAZINE"

Information for Contributors

ENGINEER MAGAZINE is an official Department of the Army publication which provides timely and authoritative information on Army engineering concepts, plans, policies, doctrine, procedures, operations, and developments. Acting as a medium for disseminating information, ENGINEER seeks to increase general understanding of the role and importance of Army engineering, and promote professional development of all officers, enlisted personnel, and civilians engaged in Army engineering activities.

WRITERS; the primary requisite for being published is your message, not your writing ability. If you have something of value to offer, whether it be in the form of a feature article, announcement, photograph, or illustration, we want to hear from you.

SUBJECTS of articles printed by ENGINEER Magazine cover nearly every phase of Army engineering, including systems development or disposal, Unit and MOS profiles, field reports of technical or tactical interest, and more. We are interested in engineer functions at all levels, from the Department of the Army down to the smallest field unit.

STYLE should be clean, concise, and written in the third person active voice. Strive for simplicity in word selection and sentence construction. The editor reserves the right to edit all manuscripts to conform to the ENGINEER magazine style, but substantial technical changes will only be made with the author's consent.

MANUSCRIPTS of feature length articles are generally 1,000 to 3,000 words, but may be longer or shorter in length. News items may be one sentence or several hundred words long, depending on your subject. A single copy of your manuscript should be submitted, typed double spaced. Send whatever art or pictorial support you can. You may want to contact your Public Affairs Office or Post Photo facility to request photographic coverage for your story. Manuscripts should NOT be under editorial consideration elsewhere at the time of submission to ENGINEER Magazine. Manuscripts should NOT contain classified material.

PHOTOGRAPHS help to clarify and explain your manuscript. Black and white 5"X7" prints are preferred, but do not limit yourself to this criteria. Submit all drawings or photographs that go with your story. Captions should be typed on a separate piece of paper and taped to the back of the art work. Don't forget to identify people in photographs by rank, first name, middle initial, and last name.

CORRESPONDENCE between authors and editorial staff is made easier by the inclusion of a complete return address and duty phone number. Contact the ENGINEER Magazine at Autovon 354-3082, and mail manuscripts or other correspondence to: Editor, ENGINEER Magazine, Public Affairs Office, Stop 12, U.S. Army Engineer Center, Fort Belvoir, VA 22060.

CREDITS or by-lines should be included with all feature articles and photographs. Feature story by-lines might include your present title or duty assignment, previous assignments, any education or experience that lends credibility to your story, and of course, your full name, middle initial, and rank.

Remember, ENGINEER is *your* magazine, with your help we can make it a top-flight professional journal.
I LOOK FORWARD TO HEARING FROM YOU!

Sincerely,

SP4 Nancy P. Lang
Editor,
ENGINEER MAGAZINE

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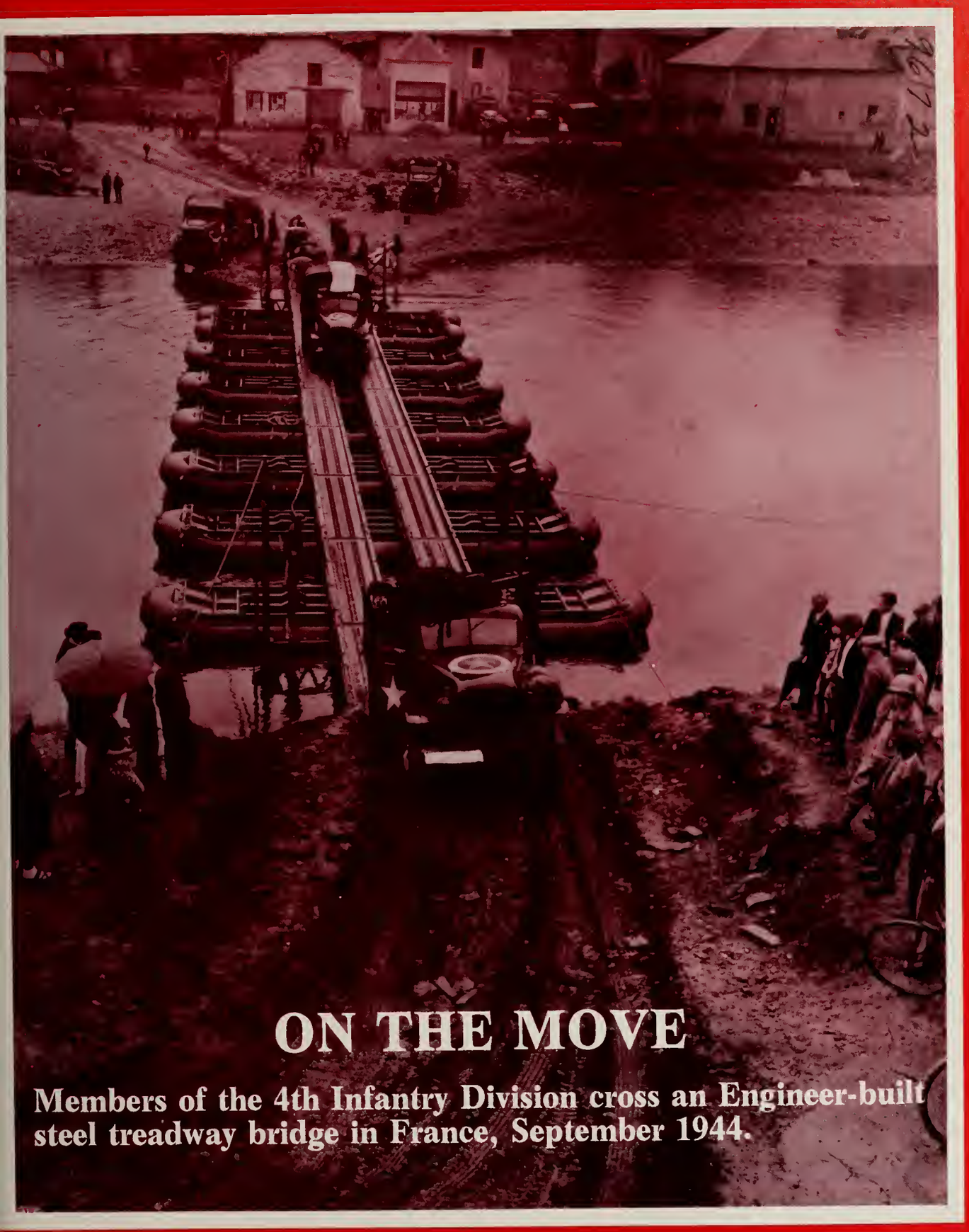
From the Editor's Desk

It has been my distinct pleasure to serve as Editor of ENGINEER Magazine for the last three years. Even before this issue went to press, I assumed new duties elsewhere. But I intend to follow with more than passing interest the continued progress of ENGINEER Magazine under your new editor. Those of you who wore engineer insignia in 1971 may recall the initial issue of THE ENGINEER, as it was called then. If so, you have witnessed several stages of growth and maturation in the format, design, style and content of the magazine. My own bias notwithstanding, I believe that the most recent changes in design and editorial content have placed ENGINEER Magazine among the top echelon of Army periodicals. I take some of the credit for the layout and design improvements, but you, the readers and authors, are primarily responsible for the vast improvements in editorial content. If it were not for your efforts and contributions—letters, articles, photos, criticism—this magazine would be little more than a newsletter. I wish to express my sincere thanks for your outstanding support during the past three years, and to encourage you to support my successor as well.

Jerome J. Hill



ON THE MOVE

Members of the 4th Infantry Division cross an Engineer-built steel treadway bridge in France, September 1944.

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"I respect everyone's right to their own view, but we have a right—indeed a responsibility—to talk about the advantages of a military profession to all Americans. All of us must give high priority to explaining to young men and women that service to the country can be productive and uplifting for the individual. I believe that."
—Gen. Edward C. Meyer
Chief of Staff of the Army

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Where we are, Where we're going . . .

page 18

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Vol. 11 Summer '81 No. 2

FEATURES

10 New Road Design Criteria for Theatre
by Capt. Ira Wagreich

11 Fort Leo. Wood, Looking for a New Image
by SFC Ron McCumber

14 114th Annual Engineer Dinner Remarks
by Lt. Gen. Joseph K. Bratton

18 M-CM-S in the Airland Battle
by Maj. Gen. Max W. Noah

22 The 36th Engineer Group
by Col. Frederick E. Bittl

24 New Countermine Capabilities for '80's
by Maj. Marion Miller

SPECIAL IN THIS ISSUE • Engineers at the Battle of Yorktown page 27

DEPARTMENTS

3 Clear the Way
4 Pipeline
6 Advance Notice
8 Forum
17 Engr. Problems
32 Upward Mobility

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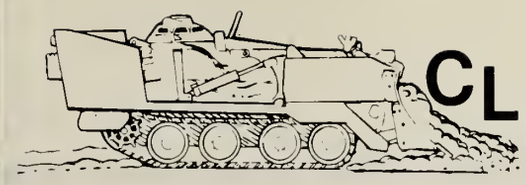

CLEAR THE WAY

by Maj. Gen. Max W. Noah

M-CM-S, Systems Program Review

In this issue of Engineer, our lead article emphasizes the combat engineers' role in the Airland Battle. I urge you to read it, learn how and why we plan to fight this way and train for it.

The name "Airland Battle" by itself describes the national dimensions of a conflict much larger in geographic size and means of waging war than we have thought about heretofore. The Airland Battle is extended" in depth, meaning that commanders at each level must "see deep", consider and take action on every echelon behind the one with which they are engaged. The action in this battle is integrated in that chemical and nuclear warfare must be anticipated and prepared for. The battle is one requiring the integration of air and normal forces to carry the battle to the enemy and win.

Combat Engineers are key to the success of this battle in supporting the mobility countermobility, and survivability (M-CM-S) of the maneuver, fire support and logistic support forces engaged in the battle. The overall concepts and doctrine derived from this battle, drive the combat engineer concepts, doctrine, and, in turn, the organization, force structure, training and material.

At our M-CM-S Systems Program Review (SPR) held in April here at Fort Belvoir the leadership of the Army took a close look at the way we plan to proceed in the areas described above. The results of the SPR are encapsulated in the article on the Airland Battle. However, it would serve well to highlight a few major areas of emphasis.

Ensuring that our forces can move unhampered has always been a first priority mission for us. On the battlefield we face the problem of massive minefields and obstacles when we carry the fight to the enemy. Our method of clearing mines and obstacles is still in the WWII mode—slow and unprotected. To take minefields and obstacles "in our stride"—at the pace of the M1 tank and M2-M3 fighting vehicle—will require much more in speed, survivability and capability. Training in speedy, precision combat drills for the combined arms and procurement of new equipment such as mine rollers, SLUFAE and line charges is essential.

Our capability to cross rivers and dry gaps is probably in better shape than any other area of combat engineering. With the new ribbon bridge and MGB plus the current MAB and AVLB, we are not exactly lacking for good equipment. But we can stand for improvement, especially in our assult capability. But for the AVLB we are currently not very capable of crossing gaps under fire.

The "Family of Scatterable Mines" concept is turning into reality with artillery delivered autotank (RAAM) and auto-personnel (ADACM) and air delivered mines (GATOR) leading the way. Our problem with these mines will be getting into the operations net to insure the mine placements are recorded. Also the preferred method of use of these mines is to compliment direct or indirect "killing" fire with a "fixing" munition dropped in *on top* of the enemy—not just to place minefields by remote means.

Finally, we as engineers must look at our own capability to operate under fire and with speed. This is the primary reason for our efforts to procure the M9 Armored Combat Earthmover (ACE). We need to move dirt, to dig, and move obstacles. We are looking for a viable concept for a new counterobstacle vehicle (COV) to replace the Combat Engineer Vehicle (CEV). The need for a turret, a gun, a dozer blade, and A-frame on such a vehicle is being looked at. If you have any ideas, let me know.

General Vessey, the Army Vice Chief of Staff, General Starry, Commanding General, TRADOC and Lt. Gen. Otis, the DCSOPS, were very complimentary on the results of the SPR. We have forwarded an Action Plan to DA to insure support as we build up and modernize much-needed combat engineer capability. Next fall we will give General Vessey an update on where we stand.

We are currently revising our doctrine to support the new FM 100-5. We will have the new Engineer FM 5-100 out in draft later this year (or early next year). We in the combat engineers need to start working and training now to support the new doctrine. M1 tanks will soon start arriving in the force. We as members of the Combined Arms Team will have to provide the best way we can to use their speed and agility. We have to be ready when they say,

"Clear the Way".

Noah
Engineer

PIPELINE

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Illinois Guard shows how it's done

During their two-week stint of duty last summer, members of Company B of the 682nd Engineer Battalion of the Illinois Army National Guard cleared 58 rubble-filled, vermin-infested tracts that had been eyesores in East St. Louis for more than two years. And in the process, they made a lot of friends. About 70 members of the unit, based in Lawrenceville, IL, demolished abandoned structures and cleared mounds of rubble in the largest community service project ever undertaken by the Illinois Guard—a result of innovative cooperation with city officials. A total of 96 men worked on the project. Mechanics, medics, and administrators were supplied by HHC, 3rd Battalion, 130th Infantry Division, Illinois Army National Guard.

The project has paved the way for a new face lift for the city of East St. Louis, Mayor Carl Officer said. The cluttered lots had stood as a symbol of scandal of past years, when federal money was paid for demolition work that was not completed.

Those responsibile were convicted of fraud and imprisoned, but with the money gone and the job unfinished, the U.S. Department of Housing and Urban Development decided in 1978 to withold $700,000 in additional community development block grant money, pending completion of the work.

East St. Louis lacked money to do the work and Mayor Officer, a former Guard member, came up with the idea of enlisting military aid.

"With this project, the Guard embarked on a new era of community service and public commitment," Mayor Officer said. "They showed not only East St. Louis but Illinois the positive direct side of the military's potential influence with a community."

"Without the Guard's assistance, none of this would have been possible," said mayoral assistant Artis Talley, who added that the city would try to have the Guard's labor accepted as part of the required local matching contribution toward federal grants for a new fisheries and gardening program.

Lt. Col. Carl Johnson, an aide to Illinois Adjutant General John R. Phipps, said the project is "probably the largest community relations project the Illinois National Guard has ever been involved in. It will not only enhance the image of the Guard and aid the community, but also improve our military readiness."

Reader wants info on Pershing Rifles

Kevin M. Born, an ROTC cadet from Lincoln, NE asks Engineer readers to help him compile a detailed history of the National Society of Pershing Rifles. The organization was founded in 1894 in honor of then Professor of Military Science and Tactics at University of Nebraska, 1st Lt. John J. Pershing.

Cadet Born is interested in contacting former members, and anyone with information on the organization. He said all loaned materials will be returned, and you can contact him at 1826 "A" Street #5, Lincoln, NE 68502.

World War I trunk is donated

A World War I Army-issue trunk full of memorabilia, which belonged to an Army engineer who fought in France, was recently donated to the U.S. Army Corps of Engineers, through the Detroit District Office.

2nd Lt. Edwin E. Scott's trunk, donated by his son Robert of Bloomfield Hills, MI, contained canteens, insignias, helmets, uniforms, equipment, photos, maps, a diary, a compass, and even a pre-1911 .45-caliber pistol. All of the items were well preserved, an official said.

The maps in the trunk are the same maps used during the Battle of the Agonne Forest, in France. The 1st Regiment of engineers frequently relieved infantry units on the front line, and in eight days of that engagement, Scott's unit suffered more than 225 casualties.

During his Army career, Scott specialized in designing buildings and vehicles. He even modified a transport plane's body to accommodate his unit's equipment. After the war Scott worked for Ford Motor Company, in Dearborn, MI, as a body design engineer. As a civilian, Scott designed the first B-24 bomber (the Liberator), the Willys Jeep, and the 1927 Ford body.

"Scott was a well-respected engineer," a senior Ford executive said. He was a member of the Society of Automotive Engineers and served on its Body Activity Standards Committee until his retirement in 1948. Scott died in 1957 at age 62.

The Detroit Distinct Office forwarded the objects to the Historical Office of the Chief of Engineers, Washington, DC, as part of the Corps' historical collection.

Reserve responsibility includes medical care

If you were injured or became sick during weekend drill or annual training, what would you do? Failure to understand the health care policies contained in Army regulations (AR 40-3 and AR 135-200) has already cost some U.S. Army Reservists thousands of dollars and as many hours of perspiration.

Take the case of an Army Reservist who fell off a truck and injured his knee during drill. Accepting the word of his supervisor and his company commander that all his medical costs would be paid for, the Reservist consulted a civilian orthopedic specialist and received $2,600 worth of therapy.

Unfortunately for the Reservist, that $2,600 had to come out of his own pocket since he never received authorization from the nearest military medical treatment facility to receive non-emergency care from a civilian source. Neither he nor his supervisor nor his company commander understood the provisions of AR 40-3; for the Reservist, it proved to be an unnecessarily expensive lesson.

U.S. Army Reservists, who want to avoid a similar fate, should be aware of the procedures to follow to obtain the medical benefits they're entitled to. Those benefits differ depending upon the Reservist's duty status.

Reservists who are injured in the line of duty or become sick during active or inactive duty of training should inform their unit of the mishap and seek care in a **military facility** as soon as possible.

Get DA Form 2173 (Statement of Medical Examination and Duty Status)

filled out by your unit commander and by the attending physician or hospital registrar. Failure to accomplish this step could severely hamper any future efforts to secure reimbursement or medical attention. Once the form is completed, it's up to the individual's unit commander to see to it that he is placed in the proper pay status and receives disability pay or whatever allowances may apply.

AR 135-200 should be consulted for pay and allowance entitlements as they vary depending upon the Reservist's duty status at the time an injury or sickness occurs.

Of course, an ounce of prevention is worth a pound of cure. But, should you need medical attention, seek military medical treatment first, inform your unit commander, and obtain written permission prior to obtaining civilian care.

Safety reminder for field sleeping

Editor's note: This item appears courtesy of Countermeasure, published by the U.S. Army Safety Center, Fort Rucker, AL.

The Army Safety Center conducted a hazard awareness survey in 1979, prior to a major field training exercise. Soldiers' answers to questions about sleeping in the field revealed that most of them don't recognize the dangers of sleeping outside designated sleeping areas. The following mishap briefs confirm this finding:

•At 2130 hours a soldier decided to take a nap while waiting for resupply during a squadron ARTEP. He lay down on the ground behind a small bush between two sand dunes and was soon asleep. A few minutes later an M113 operating under blackout conditions drove between the dunes and over the soldier. He died instantly.

•Shortly after midnight, three soldiers on an FTX climbed into an M88 tracked recovery vehicle to get some sleep. They closed and locked all the doors, turned on the heater, and went to sleep. Theydied of carbon monoxide poisoning.

To prevent these types of accidents, sleep only in designated sleeping areas, or if your mission requires you stay near your vehicle, sleep where a tree or some other large natural barrier will protect you from moving vehicles. If natural barriers are not available, sleep beside your vehicle—not in, not on, not under, not inside, not behind, not in front of, but beside the vehicle. Don't let your next nap last forever.

Mine detector performance improved

The Army's AN/PRS-7-man portable mine detector will soon be retrofitted with new electronics to improve its arid soil performance.

The Countermine Laboratory, U.S. Army Mobility Equipment Research and Development Command, Fort Belvoir, VA, has been working to improve the system since its poor performance in arid soils was first noticed in the mid 1970's.

The AN/PRS-7 had performed well in the Far East, Europe and the United States. However, during a mine clearing operation in the Suez Canal region it was discovered to have a very poor response to nonmetallic mines in desert soils.

The heart of the improved mine detector is a microcomputer which digitally processes the received signal and controls wide band RF transmitter and receiver assemblies.

When fielded, the improved mine detector, designated the AN/PRS-8, will enhance the capability of the Rapid Deployment Force, or any other unit that may be called upon to operate in a Middle East type desert environment.

Corps cleared in erosion suit

The U.S. Court of Claims recently agreed with Trial Judge Thomas J. Lydon of New York that the navigation dams on the Ohio River did not cause bank erosion or cause the natural occurrence of bank to be more severe.

The court also dismissed all claims that landowners had brought in a law suit against the U.S. Army Corps of Engineers, who built and operate the dams.

The court rejected the landowners claim that they were unfairly compensated by the Federal Government for land purchased as part of the construction process for the dams on the Ohio River.

In commenting on the decision, Col. Charles E. Eastburn, District Engineer for the Corps' Louisville District said, "Naturally we are pleased. It is a vindication of the professional and personal integrity of the people of the Corps of Engineers. We are aware that bank erosion has had a negative impact on the people who live along the banks of the Ohio River. This is a real problem and should not be dismissed lightly.

However, it is the result of a natural phenomenom and not the result of the navigation improvements that have meant so much to the lifestyle and economics of the Ohio River Valley."

Philippine library needs your help

A recent fire at the Philippine Military Academy, the Republic of the Philippines equivalent of the U.S. Military Academy at West Point, destroyed more than 14,000 volumes, including English language books, magazines and other resource materials.

During a recent trip to the Philippines Major General Herbert E. Wolff, commander of U.S. Army Western Command (WESTCOM) here, became aware of this severe loss to the Academy.

In coordination with the Chief of the Joint U.S. Military Advisory Group, Philippines (JUSMAG-Phil), WESTCOM has offered to assist in efforts to restore the library's materials by making the need known within the U.S.

Accordingly, WESTCOM, with Army missions througthout the Pacific theater, including interactions with the Armed Forces of the Philippines, requests donations from interested parties of books, magazines, corporate and institutional publications, or any English language materials of interest to college-level professional military students.

Materials should be sent directly to the Chief, JUSMAG-Phil, ATTN: Ground Forces Service Section, APO San Francisco 96528. For more information write LTC Karl Piotrowski, DCSOPS HQS WESTCOM, Fort Shafter, HI 96858; or phone him at (808) 438-1821/2905.

Remember where you heard it first...

ADVANCE NOTICE

The latest Engineer Personnel Management Contacts in OPMD have been released. All phones listed below are in Area Code 202, or use Autovon 221. Colonels should contact DAPC-OPC-AE at 325-7870/1. LTC's through 2nd LT's should contact DAPC-OPF-E at 325-8392. Warrant Officers with Primary or Alternate Specialties 621A or 310A should contact DAPC-OPW-WU at 325-7839/40. Warrants with Primary or Alternate Specialties 811A/821A or 833A should contact DAPC-OPW-GA at 325-7837/8.

Unofficial word has reached ENGINEER that possible fraud or misrepresentation rip-offs are occurring that involve enlisted assignment "swaps". Someone has been contacting individuals who send their names into service journals asking for a CONUS assignment swap listing. The potential "swapee" is asked by person or persons unknown to send in money for the listing. Be advised that service journals carry such listings free, as a convenience to their readers. The US Postal Service has been alerted that mail fraud could be involved.

Between FY 74 and FY 80 the Army's Senior Enlisted Career Force, i.e. soldiers with 10 or more years service, declined by 10,488. During the same period, the average experience level for soldiers in grades E-5 through E-9 declined from 11.1 to 10.3 years. What can YOU do to reverse this trend?

Congratulations to the 1981 Itschner and Sturgis Award winners, whose names were announced at the recent 114th Annual Engineer Dinner. These awards are presented to outstanding Engineer companies and one outstanding Engineer enlisted each year. 1981 Itschner winners are: for the Nat'l Guard, Co. D, 1457th Engineer Bn (Combat) (Corps), Utah Army Nat'l Guard, Mount Pleasant, UT; for the Reserves, Co. B, 479th Engineer Bn (Combat) (Corps), 98th Division (Training), Massena, NY; and the Active winner, Co. A 65th Combat Engineer Bn, 25th Infantry Division, Schofield Barracks, HI. SSG Billy D. Miller of Co. B, 62d Engineer Bn, 13th Support Command, Fort Hood, TX received the coveted Sturgis Award.

ENGINEER Magazine actively solicits manuscripts about Corps civil engineering projects. Civil engineers are a vital part of the Corps of Engineers, and ENGINEER strives to serve the needs of every Corps component. Other suggested topics include ideas for new or improved training methods, critiques of unit FTX's, unusual problem solving methods, and feature profiles of units or MOS's.

The Army Apprenticeship Program has 74 trades representing 134 military occupational specialties registered with the Dept. of Labor. Since the programs inception 105 soldiers have received Journeyman certificates. This program gives soldiers an opportunity to obtain a marketable skill as a direct result of their Army training. Support of this program aids recruiting and retention efforts. Your education office has the details.

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Editorial

Something to say? Write it!

by N.P. Lang

Soldiers attending the Engineer Officer Advanced Course are required to write a manuscript, suitable for publication in ENGINEER magazine, as part of their studies. Some of these students have asked for guidelines and suggestions for their work. I propose the following for all who have difficulty facing written assignments.

If you listen to people around you for a moment, you'll realize many things people say don't transfer to the printed page. People speak in incomplete sentences. They use facial expression, shrugs, nods, voice inflection, etc., which can alter the meaning of words in a profound way.

Therefore, if you try to write like you speak you may find yourself in a bind. You can't do it. You must develop a writing style just as lecturers must develop their speech.

This accounts for some of the problems students encounter when called upon to produce a written argument. They cannot effectively write what they want to say, and frequently end up in a panic because of it. The problem is not limited to students, however. At one time or another, most people find themselves poised over a writing instrument searching for the right word. No one who writes can avoid this dilemma indefinitely.

Many people come to me and say "I would like to write for Engineer, but just can't seem to get started." They are awash in a sea of ideas, but can't turn their thoughts into words.

Before **any** battle a soldier must be properly armed, and writing is a battle for most, so familiarize yourself with the available weaponry before writing a single word. You must also decide what you want to say; what you want your reader to feel, and how will you make him feel it. Making an outline before you start should help. If possible, target your paper, too. Instead of trying to write about the entire Civil War, pick one battle to dissect. Remember your audience. You wouldn't use the same style for generals as for privates, neither would you compose a memorandum for record as you would an ENGINEER manuscript.

Arm for writing by acquiring a **recent** dictionary. Get into the habit of checking the spelling and definition of every article, letter, or DF you write. Nothing will turn off your boss quicker than a proposal riddled with spelling errors. They can cost you jobs or promotions; and too many will make an editor toss your manuscript into the nearest waste can.

You may want to **shop** for your dictionary as well. There are wide differences in the number and types of words dictionaries carry. Most "pocket" editions aren't worth the money, so you may want to invest in one that will last your entire career. Sometimes I check three or four editions before finding the word I want, so if you can't verify a word using your dictionary, check someone else's. Also keep a Thesaurus handy. It's an alphabetic listing of synonyms and antonyms which is most useful when searching for that "right" word.

Once armed, your outline complete, begin the "challenge" of writing. Remember, the more words in a given sentence the longer it will take your audience to figure out what you're saying. Make one point at a time, and keep sentences to a reasonable length. A good test is to read aloud. If you can't finish a sentence without gasping for air, it's too long.

Try to write actively. ENGINEER guidelines call for manuscripts written in the "third person, active voice". Very simply, this means writing "they run" instead of "I ran" or "you were running". (Editorials and FORUM articles excepted.)

Once you've written a first draft, following your outline, check your thought construction to make sure ideas flow smoothly. If you "just can't seem to get started," try taking each note on your outline and writing a paragraph about it. Once you have 30 or so paragraphs, **then** go back and try to group them. Before you know it you will have written your first magazine article.

When you think you're finished, go back over the whole paper word by word. Check spelling, word usage, and for words that do not add to your paper's meaning or clarity. For instance, "The problem with the car was that the steering was not operating properly." Of the 14 words in this sentence, **10** of them are unnecessary! (See how many you can eliminate). The major the problem with the sentence is redundancy. If the steering isn't operating, it's obviously not operating properly. "That" can often be left out of a sentence without changing its meaning, as can "both". If the squad and squad leader are both present, you need only say the squad and squad leader are **here.** Don't use a big word when a little one will do. And don't be afraid of contractions. Re-write the above sentence as "The steering wasn't working."

Practice writing succinctly. Instead of **prior to**, use before. **Due to**, means because. **Despite the fact that**, means although. Check everything you write for redundancy and you will soon have your own list of condensed phrases.

Armed with these hints you should at least be able to face a blank page without breaking into a sweat, and you may even discover you like writing. In any event, you can't avoid this issue forever. Paperwork is as much a part of the Army these days as rifles, and you must communicate effectively to lead effectively. There is no way out, save to gird your loins and **write** what you have to say.

New Road Design Criteria for Theater Operations

by Capt. Ira Wagreich

The US Army Engineer School is presently reviewing road design geometrics for Theater of Operations (T/O) construction. This is being accomplished as part of the revision and update of TM 5-330 "Planning and Design of Roads, Airbases and Heliports in the Theater of Operations," and FM 5-34, "Engineer Field Data." In an effort to provide greater flexibility, the design criteria contained in the Army Facility Component System (AFCS) are being incorporated into the new edition of the manuals.

The AFCS contains road designs using two different traffic lane widths, 10 feet and 12 feet. This represents a major change from past design criteria. Traditionally, the minimum design width of a traffic lane has been 11.5 ft. This measurement has continuously been specified by the Standard NATO Agreements (STANAG) as the normal requirement for the width of a traffic lane. The newest agreement, STANAG 2174, dated 10 Aug 78, still specifies the 11.5 ft trafic lane for wheeled vehicles. However, the purpose of this STANAG is to standardize procedures used to determine the optimum traffic flow for a particular **existing** route. In this manner the movement of supplies over finished road can more easily be planned. STANAG 2174 describes several traffic flow possibilities, with the selection of the traffic flow pattern based on the width of the traveled way. But, at the present time there is no STANAG providing design criteria for the construction of **new** roads. In the absence of such a STANAG, AFCS is the only source of current design criteia for US Army Theater of Operations construction.

Design Control Elements	Class A 2 lane	Class B 2 lane	Class C 1 lane
Traffic Lanes			
Minimum Width (ft)	12	10	10
Lateral Clearance from edge of traffic lane to obstruction (ft)	6	6	4
Normal cross-slope (in/ft)	$\frac{1}{4}$	$\frac{1}{2}$	$\frac{1}{2}$
Shoulders			
Minimum Width (ft)	4	4	4
Normal cross-slope (in/ft)	3/4	3/4	3/4
Type (perm road)	Stable	Compacted Soil	Compacted Soil
NATO Classification for the AFC Road	Double Flow	Single Flow	Limited Access

AFCS Road Design Criteria
from TM 5-302 Vol. 3 drawing #5130 3 Mar 78

The AFCS is an index to all the Army facilities that may be required in the Theater of Operations. It contains all the necessary construction drawings and specifications as well as a list of the resources needed to build each facility. The construction drawings are presented int he TM 5-302 series of publications. Drawing number 85130 dated 3 March 1978, serves as a header sheet for the road design drawings. Found in Volume 3 of the series, it contains a full seet of design specifications for three classes of roads. These specifications include vertical and horizontal alignment criteria, design speeds and expected traffic composition. Also provided are road network requirements for typical Army units. A summary of these design specifications is presented in Table 2.

It must be stressed that, while the AFCS design specificaitons do not match the STANAG criteria, the two documents are not in conflict with

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each other. Each was written for a different purpose. The STANAG is to be used to determine road classification for planning movement over an existing road. The design criteria presented in the AFCS are for the construction of new roads. These AFCS design classifications are not to be used as road classification criteria for existing road nets. For example, the engineer constructs the AFCS Class "B" Road as a two lane road with a 20 ft travel way. The logistician, complying with STANAG 2174, must realize that this is a "single flow" road permitting only occasional traffic in the opposite direction. The traffic flow allowed by the STANAG for each of the three AFCS roads is presented here.

The Army Facility Component System is a valuable management tool for the engineer. It can be used in both the planning and execution phases of any T/O construction project. Because of its flexibility, it has already been incorporated into the coordinating draft of FM 5-330 which was circulated for comments in late 1979. It is also being incorporated into FM 5-34 which is currently under revision at the Engineer School.

Fort Leonard Wood
Looking for a new image

by SFC Ron McCumber

FORT LEONARD WOOD, MO— "I'm going to where!? Fort Leonard Wood, Missouri? Isn't that 'Lost in the Woods?' Oh, Lord, what did I ever do to deserve this?"

This has often been the first thought of soldiers upon receiving assignment instructions to the U.S. Army Training Center Engineer, Fort Leonard Wood, Mo. Such morbid thoughts come to mind because of hearing the World War II vintage horror stories and none of the up-to-date facts about one of the Army's finest military installations and one of the best kept secrets in the Army for enlisted as well as officer personnel.

What has changed since 1940? Everything. Everything except the physical location. Upon being designated a permanent post in 1956, the post began to change and is continuing to do so.

The first large, visible project was the demolition of World War II barracks and the erection of a three-brigade sized area of modern three-story, brick barracks and the erection of a three-brigade sized area of modern three-story, brick barracks complexes complete with chapels, theaters and post exchange branches. Each brigade also has a full size gym for the off-duty enjoyment of assigned soldiers. Three brigades now have some 9,000 soldiers residing in these barracks while in a training status.

Fort Leonard Wood has more than 3,000 family quarters in 23 styles. (U.S. Army photo by R.J. Staples).

The permanent party barracks, Specker Barracks complex, was completed last year at a cost of $45 million. Permanent party personnel residing in this college dorm-style complex have either private or semi-private, centrally heated and air conditioned rooms, complete with bath, some with tub.

Family housing at this mid-Missouri post is a pleasure to occupy without the waiting lists and specific requirements often faced at many other posts. If a soldier and his wife sign in one day, they will probably move into one of the 23 styles of housing usually within 2 weeks. Government furniture, however, is in short supply.

Bachelor NCO and officer housing is available in either the new Specker Barracks complex or in the Sturgis Heights area. Both include modern facilities with E6s authorized semi-private rooms and E7s and officers authorized private rooms or suites. Suites usually have a waiting list. Geographical bachelor housing in these facilities depends upon the availability of rooms.

Dependents attend the school closest to their quarters if they reside on post. Three elementary schools and one junior high serve dependents, with high school students being bused to nearby Waynesville, Mo., a seven-mile drive. Pre-school kindergarten is available on post; the nearest parochial school is in Rolla, Mo., a 25-mile bus ride.

Fort Leonard Wood and the Show-Me State offer some of the best recreation in the nation. Hunting,

fishing, trapping, spelunking, boating and swimming are just a few of the available attractions.

The post golf is an 18-hole championship course over natural rolling terrain complete with sand and water traps, clubhouse and picnic area. The Roubidous Creek and Big Piney River flow through the reservation offering outstanding fishing as well as canoeing and boating. The run-off of a natural spring has been diverted to form a cold water stocked trout stream with the season opening March 1 annually. Other trout parks are readily accessible within a two-hour drive, featuring lunkers up to 10 pounds.

The Lake of the Ozarks, 45 miles away, offers boating, fishing, skiing and night club style entertainment. This lake, one of the nation's largest, has approximately 1,000 miles of shoreline. Fort Leonard Wood has a recreation area on the lake to include a marine, PX and cabins for rent at nominal costs. Lake Taneycomo, Table Rock Lake and Branson Lake are also within easy driving range.

Turkey and deer hunting are two of the favorite sports on the military reservation. Fort Leonard Wood is one of the few areas in the United States that has never lost its wild turkey population. Firearm, black powder and bow and arrow seasons are observed. Hunters took 356 deer on the installation during 1979. Deer season includes the taking of does during certain days. Firearms, black powder and bow and arrow hunts are licensed.

If a soldier or his/her dependents are equestrian oriented, the Fort Leonard Wood Riding Academy offers stables and instruction. Mounts and gear are available at a nominal cost. Trail rides as well as rodeos are sponsored periodically.

The relatively low cost of living in the Fort Leonard Wood area has proven attractive to many personnel. The post exchange with numerous branches and the post commissary are well stocked. Civilian shopping centers are available in St. Robert, Rolla, Springfield, St. Louis and Kansas City. Most are within a two or three hours drive. St. Robert is one mile away and Rolla, 25 miles.

The General Leonard Wood Army Community Hospital is a modern 500 bed facility offering a variety of specialized clinics. (U.S. Army photo by R.J. Staples).

If an individual is an avid swimmer, the facilities are available at three outdoor pools. Tennis buffs can choose the area in which they desire to play on cement, well-lighted courts that remain open throughout the year. Courts are located in the housing areas as well as in other recreational areas. Five gyms are available with most including squash and handball courts. A two-wheel and 4-wheel off the road area track for multi-terrain vehicles is open most of the year.

Fort Leonard Wood offers a variety of assignments for the professional soldier. The 3d Basic Training Brigade, composed of four battalions, teaches basic training to both male and female soldiers. The 2d Training Brigade (One Station Unit Training) teaches basic and combat engineer advanced individual training while the 4th Training Brigade teaches OST training and 15 different military occupational skills to include two warrent officer courses. These 15 MOSs are taught to male and female soldiers and also to U.S. Air Force, U.S. Marine Corps and to selected foreign soldiers.

The General Leonard Wood Army Community Hospital, a modern 500 bed hospital, is rated as one of the finest in the military. This is one of the few hospitals that has never curtailed services to retirees, their dependents or any other category of authorized patients. The Fort Leonard Wood Dental Activity includes six dental clinics that continue to give service to dependents and retirees as well as active duty personnel.

Fort Leonard Wood has all of the above. What doesn't it have? It doesn't have a large city immediately outside the gate, it doesn't have unreasonable costs of living, it doesn't have a high crime rate, it doesn't have air pollution. What else is present? The opportunity for one of the best assignments in a professional career, for the soldier as well as his/her dependents. If any soldier or dependent desires further information, he/she may call the Fort Leonard Wood Public Affairs Office at commercial (314) 368-8514/7925 or AUTOVON 581-8514/7925.

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NCO Corps: Museum is first to be dedicated solely to noncommissioned officer

FORT BLISS, TEXAS—The Army's only museum dedicated to the history of the NCO Corps opened at the U.S. Army Sergeants Major Academy here, June 24, 1980.

According to museum curator, Dr. Daniel Zimmerman, the museum honors the NCO's accomplishments and service to the nation. "There are other museums that have exhibits covering the same periods of history," he said, "but this is the first museum dedicated soley to the history of the NCO corps."

The exhibits depict the history of the NCO corps by historical periods: The Revolutionary War period, 1775-1783; 1784 to 1860, including the War of 1812 and the Mexican War; The Civil War period, 1861-1865; The Indian War period, 1866-1891; 1891 to 1916, including the Spanish American War and the Pershing Expedition; World War I; World War II and Korea, 1940-1952; And from 1952 to the present, to include the Vietnam Era.

According to Dr. Zimmerman, some reproductions were used in creating the exhibits. "Original artifacts," he said, "make up about 95 percent of the exhibited items, some of which (like a wooden canteen) date back to the Revolutionary War." From the Civil War period the museum has three original uniforms (two Union Army and one Confederate) as well as original documents, military equipment and photos. Additionally the museum has several Regular Army knap sacks from the Civil War Era, which Dr. Zimmerman states are "exceedingly rare."

Other original items on exhibit at the museum include: several weapons such as a NCO Light Artillery Sabre from the War of 1812 and a model 1842 percussion pistol from the Mexican War period; personal items from various periods of history like a Bible, musical instruments, letters, books and post cards; and tools and living essentials such as an oil lamp, wood burning stove and kitchen utensils from the Indian War period.

"Reproductions," Dr. Zimmerman tells us, "were used where original items were unobtainable because of their extreme rarity." Also, according to Dr. Zimmerman, those reproductions which were used were created only after extensive research. "Before building any reproductions we researched each item," he said.

"In creating the 1890's barracks scene for instance," Dr. Zimmerman explains," we first had to research and answer several questions in order to get an idea of what barracks life was like in the 1890's. We wanted to know how the barracks were furnished and how they were heated. Where did the soldiers store their valuables and clothing and where were their weapons kept. What kind of bed did the 1890's soldier sleep on?

Once we learned all that we could about the soldiers life style during that period then we could begin to design the exhibit. We know for instance that the soldiers had very little free time. They spent most of their time cleaning the barracks, grooming their horses, or out on patrol. And, up until the time that towns began to spring up around Army posts for protection, the soldiers assigned to these outposts had to be totally self-sufficient. They would arrive in the middle of nowhere and build their own barracks, mess hall, orderly room, and other buildings. They even grew their own food.

When creating the barracks scene, "he continues," we were able to locate many original furnishings such as a chair, lamp, footlocker and stove. We even found some original playing cards and dime novels from that period of history. But we couldn't find a bed which, of course, was crucial to the exhibit. So, based on an old photo and some original documents, we reconstructed a bed similar to the kind used during the 1890's. We also had to build a table and we laid down a hard-wood floor, as would have been the case back then. Additionally, we used a special lighting arrangement to create a 'warm' glow around the exhibit."

When asked just what a person would learn from visiting the museum, Dr. Zimmerman replied: "Hopefully, people who visit the museum will leave with a better understanding of the history of the noncommissioned officer. They will know something about how the NCO lived and worked during each period of history. One little known fact, for example, is that it really wasn't until the Civil War that NCO's were officially put in charge of troops. Prior to that only officers had authority over soldiers. There may have been isolated incidents where NCO's took command during emergency situations, but officially NCO's were not in charge of troops until the Civil War. After visiting the Museum of the NCO, perhaps people will have a greater appreciation for the NCO's accomplishments and contributions to the nation."

In addition to telling the history of the NCO Corps through artifacts, the museum will initiate and maintain an ongoing oral history program. This will include a series of personal interviews with NCO's, both retired and still on active duty. The purpose of the program will be to add to the current knowledge of NCO history. According to Dr. Zimmerman the program will probably begin with interviews of past Sergeants Major of the Army and will include questions like: "What was your perception of the role and status of the noncommissioned officer when you entered the Army. Had it changed after you earned your first chevrons?"

According to Dr. Zimmerman, transcripts from the oral history program will be maintained at the museum along with other historical documents and artifacts for research purposes and traveling exhibits. Visiting hours are 8 a.m. to 4 p.m. Monday through Friday.

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Domestic Action Projects:

BOON OR BUST?

DAP can build good will or destroy it—It's up to you!

by Maj. Stephen Morse

Editor's Note: Although this article specifically addresses Reserve DAP, Active commanders can apply these guidelines, too.

Domestic Action Projects (DAP) by Army Reserve Engineers can benefit both the community and Reserves. The community benefits by obtaining a needed facility at nominal cost, and the Reserve's mobilization readiness and strength can benefit by training at tasks not usually available to the unit.

Satisfactory DAP do not happen by chance. To be successful, a DAP requires extensive planning, coordination, and supervision. This article briefly describes the DAP process, and some lessons learned from a Reserve Engineer unit viewpoint.

GETTING STARTED

Long before any extensive plans are made, both the Reserve unit and the "customer" organization must know the rules, regulations, and needs of the other. Army Regulation 28-19 specifies the Army's requiements, but local commanders and the chain-of-command may add their own requirements. A fact sheet is helpful. The customer must be specific in its request but should be flexible as to how the project may be accomplished, especially in terms of time. A clear representation of the needs of both parties can eliminate an unfortunate misunderstanding later.

The ideal scenario for determining an acceptable DAP for the Reserve Engineer commander wouild come after he has assessed his training needs for the year (utilizing FORSCOM Reg. 350-2, command guidance, internal and external ARTEP, AT evaluations, SQT requirements) and just before he finalizes his Yearly Training Program Forecast. While some Reserve commanders may have this ideal situation, mot commanders experience DAP requests that are sporadic, tend to fall into several repetitive types of projects, and may often have cogent reasons other than training for their consideration (e.g. public exposure, command request, recruiting, retention).

REGULATION, COORDINATION

The usual situation for initiating a DAP is an organization with a project request contacting a Reserve unit. If the customer meets the eligibility criteria of AR 28-19 (and any local requirements), and the commander finds that a brief joint reconnaisance be made of the project site to ensure that the type and scope of the project matches the customer's proposal. If the commander does not have the approval authority for DAP, he should also inform his next higher headquarters of the contact and his initial disposition of the DAP request.

Once the commander and the customer agree that the proposed DAP meets their needs (with higher headquarters approvals as necessary), the detailed planning and coordination can begin. The commander should require the customer to furnish:

1. A release from the local building trades council (i.e. unions) that they will not oppose the Army Reserve's participating in a specific DAP.
2. A statement releasing the Army Reserve from liability (i.e. a "hold harmless" clause).
3. A statement that the customer will supply all materials and underwrite all costs above normal training incurred by the project.
4. A statement acknowledging the fact that due to changes in commitments, the Army Reserve may have to leave the DAP imcomplete at any time.
5. Any building permits or approvals as may be necessary.
6. A statement of ownership as necessary.
7. Plans and specifications as agreed upon.
8. Contact person/coordinator (with telephone number).

It should be made especially clear to the customer that the project cannot commence until the above acitons are complete, and the command has given all necessary approvals.

The Army Reserve Company Commander has an obligation to provide the customer with:

1. Any plans as agreed upon.
2. A construction management scheme that includes:
   - schedule of tasks
   - bill of materials (BOM)
   - surveys and construction control
   - quality control/inspection
   - equipment needs and scheduling, including rentals if necessary
   - supervision/management responsibilities
   - construction progress reports.
3. Contact person/project officer (with telephone number).
4. Cost estimates and monies necessary.
5. Procedure for changes.

To enhance unit training and project control, the commander should additionally develop (and usually higher headquarters requires):

1. A project order with specifications for mission, responsibilities, and time schedule.

2. Tasks to be trained and evaluation plan:

- by Soldier's Manual
- by ARTEP
- by Yearly Training Program and Forecast.

3. Unit logistic support, i.e. mess, fuel, maintenance, transport.

4. Integration and evaluation of other unit training needs, i.e. tactical security, tactical feeding, and camouflage.

5. Project, progress, and after-action reports.

Experience has shown time and time again that thorough planning and coordination prior to any actual construction pays significant dividends that will result in an orderly work and material flow, satisfactory training, identification and resolution of potential problem areas, and proper assignment by task for the responsibility of supervison and implementation.

The 1249th Engineer Battalion recently completed a Domestic Action Project which earned them the Oregon Govenor's Unit Citation.

LESSONS LEARNED

I have found that the "hands on" experience of implementing numerous DAP with Reserve Engineers has provided several insights for successful projects. I offer the following lessons learned:

Keep a permanent sample request on hand, and/or a checklist of actions to be completed. This can help you and the customer by making applications easier, uniform, and complete.

Don't string a prospective customer along. One should be able to immediately ascertain from his YTP and YTF wheather a proposed DAP can proceed past the initial customer contact. If the customer must be turned down, do it in a gracious and timely manner.

The best DAP are those that are of short duration (e.g. less than three MUTA-4), are well organized and coordinated, involve maximum manpower and minimum equipment, and are visible, lasting, and useful.

If a proposed project offers significant training benefits, but is too big to fit alloted training time, alternate proposals to the customer should be considered, such as reducing scope, dividing the project into sub-elements with Reserves only doing work for which they are best suited, extending time for completion, renting additional equipment and/or using transit mixed concrete to shorten time.

Delegate! DAP are valuable training tools for training and evaluating junior leaders. DAP offer one of the few opportunities during MUTA to exercise and evaluate the full spectrum of command and leadership. Time-tested methods include mission-type orders, required pre-work briefings, project planning documents (i.e. CPM, BOM), and on-site inspection.

Make sure the customer's coordinator represents the organization and can make responsible decisions "on-the-spot".

The scheduled work should be stages such that if it must be stopped or delayed some benefits will be evident for both parties and no irrepairable harm will result (e.g. erosion, materials storage, and security).

Keep travel time to a minimum. A short travel time will lessen logistic problems and put more productive time to use training.

Don't forget safety. Designate a safety NCO. A short daily pre-training "tail-gate" session oriented to the day's tasks works best.

Avoid DAP that are heavily equipment dependent. Maintenance, security, and logistics can be overwhelming. However, you should consider the following when evaluating equipment dependent DAP:

- equipment dependent projects are acceptable if equipment operator training, especially for non-MOS qualified personnel, is the primary goal.
- don't accept DAP that will significantly impact your fuel allocation unless the customer will pay additional fuel costs; be especially concerned with hauling projects.
- where a DAP could provide good equipment training benefits, consider splitting training of the unit to different MUTA's so that more hours are available for equipment useage and training.
- don't forget maintenance and equipment security each MUTA.

You should capitalize on DAP with an active community relations effort through contacts with newspapers, TV, or radio. Utilize the Public Affairs office of your command. An active DAP is often cited as a reason for retention of unit members and the first exposure to new members.

Project reports, records, and after-action reports are important. These records provide good training documentation, briefing background papers, and references for consideration of similar DAP.

BUILDING THE RESERVES WITH DAP

The Army Reserve as a part of the community draws its strength and support from the community. The Army Reserve Engineers can increase their strength and community support by participating in DAP. However, the Reserve commander must assure himself that a proposed DAP will meet his mission and training goals.

When a DAP is selected for implementation, the commander must gain the maximum benefits from the DAP by accomplishing as many objectives as possible without sacrificing quality. With the proper selection and tailoring of DAP, and an imaginative implementation of his training program, the commander can simultaneously meet his training goals and benefit the community.

Major Stephen Morse served 13 years with the 820th Engineer Battalion (Combat), San Pueblo, CA, (USAR), four years as the battalion's Operations Officer. Major Morse presently serves as Medical Regulating Officer for the 2nd Hospital Center at Hamiliton Field, CA.

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Corps celebrates 206th birthday

114th Annual Engineer Dinner Remarks

Chief of Engineers, Lt. Gen. Joseph K. Bratton, sums up Corps commitments around the globe

You have already been welcomed. Let me extend to you now my own warm greeting. These annual dinners are very special events—memories commingled with present challenges and anticipation; and all of us gathered together out of respect and devotion to our particular part of the U.S. Army—its Corps of Engineers.

I should like to add a personal special welcome to my mentors and predecessors here present: Generals Wilson, Cassidy, and Clarke. I have received personal letters from Generals Itschner and Morris, who are unable to join us this evening, but who wished to pass on their warm regards to us all.

Our theme tonight is the Engineers as Soldiers and Builders, and I have had a remarkable opportunity to observe both over the past several months while traveling in the United States, Europe, and the Middle East. I have visited the other Army major commands and all our principal Engineer offices save those in the Pacific area, where I am planning to go next month. As I expected, following a decade of wise leadership by Generals Clarke, Gribble, and Morris I find the Corps to be superbly professional and in vigorous good health. There is consistently outstanding work being done in our Engineer Divisions, Districts, and labs, as well as by Engineer troop units and staff elements throughout the world. Had you traveled with me, you would have been as proud as I am.

You would also have found—or rediscovered—the high regard in which the Corps is held by the large majority of the American public and by their elected officials, both in Washington and elsewhere throughout the country. We should keep in mind (and not hesitate to remind others, in and out of uniform) that the Corps is that part of the Army, and indeed of the Defense establishment, which most contacted and observed by the people—usually at our construction sites and recreation areas.

If we are properly to regard ourselves as Soldiers and Builders, we need to establish a common perspective. The Corps is so big, so diverse, and is doing so much in so many parts of the world that it is sometimes difficult to sort out our priorities.

We must keep clearly in mind the nature of our root mission: to support the Army. We do this by doing our best to insure that Engineer soldiers both Active and Reserve—remain an effective part of the combined arms team and provide engineer support on the battlefield and throughout the combat zone; by building for the Army and the Air Force; by maintaining to high standards our facilities and housing; and by being ready, using our active in-place military construction and civil works organizations, for the very large construction demands we could expect in event of mobilization.

In addition, because of our proven capabilities, the Corps through the years has been given a variety of nation-building tasks which we identify today as our Civil Works program. The Corps has proved itself an organizaton sensitive to evolving national objectives and responsive to changing national needs. We have given the nation quality products, reliable financial manage-

ment, and sound environmental practices; and we have done so with a continuing awareness of public needs and desires and a careful stewardship over its investments. I doubt that any other single organization has contributed to the strength of the United States so well for so long, and with such a high return on the taxpayer's investment.

But let me reiterate: the fact that we do and build so many things so well should not mask our basic objective: to support the Army and its soldiers. We continue to stress the priorities of Manning, Force Sturcture, Training, Modernization, and Mobilization as spelled out in the Chief of Staff's White Paper. That guideline remains a charter for actions by the Corps, and indeed Corps involvement is an important factor in achieving the Army's objectives in each of these major areas of priority.

The years ahead

Four years ago, at the beginning of the previous administration, the Corps was forced to fight for survival, at least as far as its civil programs were concerned. We won that struggle because of the excellence of our work and our reputation; our projects stood the test of hard scrutiny.

We face no similar situation today, but I do suggest that we nevertheless are gonig to be directly challenged—at a time when Mr. Stockman's budget shears are sharp and when there are compelling pressures to reduce the federal work force—to prove our mettle and streamline our operations. For example, the Corps has been directed to reduce its Civil Works civilian personnel spaces by 3,000 by October 1982—that's more than a 10% reduction in the next 16½ months. A further reduction of 10% is programmed for the subsequent four years. For this substantial reduction, we can no longer limit ourselves to the salami slice approach; we must cut functions and examine organizational realignments.

On the other side of the Reagan coin, the Army will benefit from the increased funding for national security. The Army budget requests for 1981 and 1982 have been increased by about $2.5 billion and $7.5 billion, respectively. Most of this increase of $10 billion plus is for modernization of equipment—unfortunately, very little for engineer equipment—but there is a substantial amount for construction and repair and maintenance of facilities. Moreover, because of the sizable increases forecast in construction for the Army and Air Force, the Corps is scheduled for significant increases in Army civilian strength for our military programs in FY 1983 and the out-years. We are now looking at a total Army budget for FY 1983 of almost $60 billion; that's more than any of us could have estimated even a short time ago.

Overseas, in Saudi Arabia our work is literally nation-building, with a program now amounting to almost $20 billion, stretching at least through this decade. It provides excellent experience for many of our officers and civilians in large-scale construction management.

In Israel, our effort is smaller but more urgent. The mission is to complete two new airbases in the Negev Desert for the Israeli Air Force by next April, to permit Israeli withdrawal from their present bases in Sinai under terms of the Camp David Accord. This job is a major challenge to all involved—fast track construction of two extremely sophisticated bases which must be done on time, within budget, and with first-class quality to suit a very discriminating customer.

In March I was able to visit our U.S. Army in Europe, a force of over 200,000. The Engineer units there are in good shape and are receiving high praise from senior commanders. The soldiers are good—as capable and confident as any I've worked with in CONUS, Europe, Korea, or Vietnam. They reflect the excellent training program at Fort Leonard Wood. I saw little evidence of the quality problem about which we frequently read; only one commander, of many I queried, had complaints. As always, the better the NCO and junior officer leadership, the better the troop performance.

"If we are properly to regard ourselves as Soldiers and Builders, we need to establish a common perspective . . ."

Support your troops

Unfortunately, I cannot report that we are supporting those soldiers as well as they deserve—in housing, facilities, or equipment. General Kroesen made the point strongly to me when he told me that the number one peacetime problem in Europe is family housing—not training, not manning, not stationing, and not modernization. We are short over 7,000 family housing units in Germany, and those we do have need a higher sustained level of maintenance and repair. In a number of units, we are still maintaining equipment in stables built for the Kaiser's World War I army, with costly vehicles parked in muddy motor pools—hardly the environment to motivate young soldiers to care properly for their equipment; and all this some 36 years after V-E Day.

In agreement with General Kroesen—and the other MACOM commanders—I consider it imperative that we make a major effort to do better. At present our Facilities Engineers and Directors of Engineering and Housing, in CONUS and overseas, have a big job trying to make too few dollars go far enough against a big maintenance backlog. If you believe a battalion commander has a tough job in USAREUR today, consider the understaffed and overworked DEH in one of our larger communities there—Frankfurt, for example, or Nurnberg. Fortunately, the Reagan budget is going to help us in Europe and elsewhere; but we have a lot of hard work ahead in this area, and we had better realize that a big part of the Army perceives the engineers from the perspective of the facilities management, and great work in the field by engineer troops and around the nation in our engineer MACOM can be offset quickly when the Facilities Engineer does not have the tools to take care of the soldier and his family.

There is some hope for improvement in our garrison support of the soldier and his family. The 1982 budget as

"In a number of units we are still maintaining equipment in stables built for the Kaiser's World War I army"

amended by the new Administration will, for the first time in some years, arrest and reverse the growth in the Backlog of Maintenance and Repair. We plan to give this area special emphasis, since it has for so long eluded an effective solution.

Two other major construction programs which are already underway but not yet fully defined are those associated with the RDF in Southwest Asia and the Missile-X program. The latter, in particular, could be the largest construction task we have ever undertaken. The full construction price tag for the system approved by the Carter administration exceeds $22 billion. We expect a major impact on the Corps, assuming continued M-X support by the Reagan Administration. Pending the report of Secretary Weinburger's Blue Ribbon Panel and a final decision by the President, we have begun to staff up at Norton AFB, and will be sending an Engineer general officer there next month to assume Construction Agent responsibility.

The root of our mission

Let me turn back now to what I said was our root mission—support of the combat Army in the field. We need Engineer forces that can keep pace on the battlefield with the armor and mechanized infantry and artillery units. Unfortunately, we don't yet have such a force; our Engineers are largely equipped with the technology of WW II and Korea. But there is hope; last month, for the first time in several years, a full Engineer Systems Program Review was conducted here at Fort Belvoir and chaired by General Vessey, the Vice Chief of Staff. A first step in closing our equipment gap should be with the fielding of the M-9, or ACE (for Armored Combat Earthmover), formerly called the Universal Engineer Tractor. The first buy is supported in the 1982 budget and units should be receiving the first M-9's in 1983. With the M-9's and hopefully the other items needed to provide for modern Mobility-Countermobility-Survivability, Engineers will be able to keep up with the new tanks, fighting vehicles, and self-propelled artillery. Unfortunately, all of this won't be in the hands of the 12 billion until near the end of this decade. We do have the ears and support of the combined arms commanders; now we need to give our Engineer soldiers the tools to do the jobs those commanders are expecting.

I would be remiss this evening if I did not mention a subject which I find increasingly of concern, and that is our perennial shortage of Engineer officers in all grades from captain through colonel. At a time when we must struggle to compete for good people against strong private sector demands, we Engineers have too much to do with too few. Our problem is worsened by a disappointing retention record and the necessity to turn on several tracks—notably troop command, contract construction, and facilities engineering, while still accepting our fair share of branch-immaterial assignments. Our officers—more than any other branch of the Army, I believe—must do all things well; they must be "officers for all seasons." We must all be vigilant recruiters for the Corps, doing our best to counsel and retain young officers and encourage their further studies in engineering disciplines where academic credentials so indicate.

Looking to the future in this year of the Yorktown Bicentennial, we should be impressed by the fact that—if we are really going to rearm and reindustrialize America—the nation will need more than ever the disciplined precision, the inquisitiveness, the professional excellence, and the personal integrity of its engineer leaders. It will need the full measure of our capacity to plan, organize, and execute complex military engineering tasks. I believe the Corps, as the nation's premier engineering organization, is ready to provide that capacity. We are in for years of tough going—but this is a decade of national opportunities as well as vulnerabilities, and there are many in this room who will be coping with our national security problems into the 21st century.

General MacArthur called WW II in the Southwest Pacific an "Engineer's War"; perhaps he would perceive this present time as an "Engineer's Peace."

Let me leave a final thought with you tonight. I ask you to look around this room, at the company you are in, and ask yourselves how many other Americans can take the pride and satisfaction we have in what we are doing, how we are doing it, and the organization which unites our interests and efforts. We are a fortunate few, measured among 230 million Americans. We count our service in tangible ways. We leave a trail of professionalism and achievement for all to see and benefit from. We are proud to sign our work. Finally, we are not content to stand still and rest on successes of the past; we are a proud and forward-looking part of the Army team, and we intend to stay up front where we belong.

And now, I wish you all continued professional achievement and personal satisfaction. I consider it a great honor to be here tonight as a speaker and a member of the team, and I thank you very much.

The Civil Engineer Problem

Solutions page 31

An airport requires 4,500,000 cubic yards of fill. The fill will be compacted to a void ration of 0.7. Three borrow pits are to be evaluated to determine the most economical fill operation. The void ratio and estimated haul cost for each pit is:

Pit	Void Ratio	Haul cost per bank cy
A	1.2	$0.24
B	0.9	$0.26
C	1.1	$0.25

Which pit should be utilized, and what will be the Haul Cost for this project?

The Military Engineer Problem

The 52d Infantry Division (Mechanized) must defend a portion of the II Corps defensive sector. The G-3 has analyzed the threat and established Brigade sectors.

2d Brigade is given the narrowest sector, astride the enemy's probable main avenue of approach. A supporting attack is expected in 3d Brigade's sector. 1st Brigade's area has restrictive terrain and a major attack there is unlikely.

As the Assistant Division Engineer (ADE), you have completed estimate of the required engineer effort. The divisional covering force requires four engineer companies, 2d Brigade requires three companies, 3d Brigade requires two companies, and 1st Brigade requires one company, as indicated below.

Since 12 companies of engineer effort are required, the division has requested and received the support of two corps combat battalions.

Acting as Assistant Division Engineer, task/organize the divisional engineer battalion (mechanized) and the two corps combat battalions within the division area. In developing your solution you should consider:

- The Command/Support (C/S) relationship of the Engineer Corps Combat Battalions to the 52d Division.
- The C/S relationship of any engineer companies sent forward to work in the Brigade areas.
- The utilization of the mechanized divisional engineers in conjunction with the less mobile corps engineers.
- Who is to be the Brigade engineer for each brigade area and who will direct the engineer effort in the covering force area?

REQUIREMENTS

1st Brigade
1 company

2d Brigade
3 companies

Covering Force
4 companies

Division Control
52d Engr Bn
500 Engr Cbt Bn
502 Engr Cbt Bn

3d Brigade
2 companies

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—M-CM-S—

Mobility, Countermobility, and Survivability in the Airland Battle

by Maj. Gen. Max W. Noah

The Airland battle combines such concepts as the integrated battlefield and the extended battle. The concept stresses a deep attack of the enemy's follow-on echelons, together with a quick decisive strike against the assault echelons. The need for Mobility, Countermobility, and Survivability are the requirement and the business of the combined arms team, with the combat engineer providing the expertise and much of the capability. The recent M-CM-S Systems Program Review '81 at Fort Belvoir, focused on these tasks and provided direction for the future.

More than ever before, our success in the first and succeeding battles of the next war will hinge on the battle commander's use of time and terrain. These are the critical two variables open to the commander as the battle begins. He will fight outnumbered. His resources—troops and equipment—are essentially fixed at the onset of battle. His plans and training must be perfected and he must use time and terrain to reduce the odds against him.

He uses time by seeing the enemy deep and determining where to apply all his assets at the precise time to win the battle. He uses terrain to enhance combat power by blocking, delaying, and destroying the enemy while overcoming obstacles and moving his own force. Whether the combined arms team with its combat engineer can sufficiently achieve these effects is critical to winning.

This is what Mobility-Countermobility-Survivability (M-CM-S) is all about. It is essential to battle success and ensuring its understanding and use is the primary job of the combat engineer in the combined arms team.

The business of M-CM-S in the Airland Battle was the topic of the April 8-9 Systems Program Review held at Fort Belvoir. About 150 participants representing a broad cross section of the Army's decision makers in the U.S. and abroad, both active and reserve components, and the Marines and Air Force, reviewed the current and future status of M-CM-S. Only those M-CM-S tasks forward of the corps rear boundry were addressed. Certain engineer functions such as water and power generation were excluded from review so that the scope could be limited to combat tasks.

Three fundamental points emerged: First, M-CM-S is a total combined arms job—while the combat engineers are key to achieving M-CM-S, they cannot and should not do it alone. Secondly, the entire team needs the integrated concepts, doctrine, and training to achieve M-CM-S on the battlefield through well defined and rehearsed battle drills to breach or cross mines and obstacles in stride, create obstacles, and dig in for increased battle position survivability. Finally, the hardware to support these tasks must be compatible with the systems being supported. It must be mobile, efficient, survivable, and deployable, and it must be developed systemically based on concepts and doctrine to solve the M-CM-S tasks.

The commander's skill in fighting the Airland Battle is the key to winning wherever the enemy uses Soviet-style tactics. These tactics are based on three fundamental concepts: mass, momentum, and continuous combat. His operative notion is to break through quickly and collapse the defender's system of defense. Alternatively, he uses suprise, which he may substitute for mass, but either tactic depends heavily upon maneuver. Those tactics coupled with a numerically superior enemy demands that we see him early and attack deep into his follow-on echelons to wrest the initiative from him and retain it to win.

As analyzed by Gen. Donn A. Starry's "Extending the Battlefield" article in the March 1981 *Military Review*, this extension of the battlefield deep into the enemy rear means that we must simultaneously engage both the assault and the follow-on echelons. In doing so, we disrupt his timing, frustrate his plans, and complicate his command and control.

The battlefield must also be extended in time—the commander develops his plans to ensure the close-in battle can be won decisively.

Lastly, the battle is extended to higher level resources which the commander uses to complement his own assets to win. These resources include all higher level army and other service acquisition and attack capabilities.

All of this, then, means that the battle must be fought more deeply—in place, in time, and in resources—than now forseen by our current doctrine. Our doctrine must be defined to cope not only with depth but with the entire range of conventional, nuclear, and chemical warfare.

Certain requirements are fundamental to this battle. To delay, disrupt, and destroy the enemy's follow-on echelons, we must **see deep** and maximize our interdiction efforts through all available means. At the same time, we must **move fast** against the assault echelons and **strike them quickly**—they cannot be permitted to achieve their objective. Lastly, the opening fight against these assault and follow-on echelons must be finished rapidly.

Mobility, countermobility and survivability are clearly key to these Airland Battle requirements. Without mobility on that battlefield, we cannot move or maneuver our forces with sufficient speed to destroy the overwhelming numbers facing us. And we must block, disrupt, and slow the enemy—hence the countermobility need. Lastly, to meet the first blow and survive to win, we need to dig in to protect our high value resources. Each of these hinges upon altering the terrain to our benefit, and so basic to all is the need for continuous and accurate terrain analysis.

The M-CM-S battlefield tasks may be divided functionally as follows: mobility is composed of countermine, counterobstacle, and gap crossing; countermobility of mine warfare and obstacle development; and survivability the provision of fighting/protective positions through digging and overhead cover. Each of these tasks needs to be accomplished by the application of systems to do the job—systems which stem from the integration of concepts and doctrine with soldiers drilled in the task and using hardware designed to the requirement.

Countermines. The threat use of mines to disrupt and delay our maneuver elements and logistic support will be widespread and continuous. We can expect mines throughout our operational area—from forward of the front line of troops to all the way into our rear areas. Additionally, our own use of scatterable mines may well require the commander to move through or near his own minefields. With the critical importance of maintaining our mobility in the Airland Battle, it is absolutely essential that we have an effective countermine detection and neutralization system. In countermine concepts and doctrine, the critical questions today are the extent to which the non-engineer members of the combined arms team should be capable of breaching minefields, and what percentage of assured neutralization is needed. In this as well as the other M-CM-S tasks, we need combined arms team battle drill techniques for breaching minefields in stride. Organization and force structure, training and materiel all hinge upon this requirement.

M9ACE

The highly mobile, highly survivable, combat engineers' Armored Combat Earthmover advances with the maneuver force, performing tasks across the entire M-CM-S spectrum.

The countermine capability fielded today is essentially unchanged from World War II. It is too slow and vulnerable to fire. The only detection and breaching capability with reasonable speed close to being available now is the mine roller, which, while effective now on our M-60s, may prove extremely effective when mounted on the front of the far more powerful Abrams tank. While this item is helpful, no one device will do the entire job. Hardware must be designed as an integrated system based on the concepts and tactics of the drill. For stand off breaching, there are two explosive devices which have been developed—the surface launched fuel air explosive mine detonation system (SLUFAE) and the mine clearing line charge (MICLIC). Complementary items which round out a countermine hardware system set are the plow and clear lane proofing systems for proofing, and the combat lane and hand emplaced marking devices. In development with significant promise of contributing to the light infantry needs is the POMINS—a man portable mine and light obstacle neutralizer. Still to be solved is the vexing problem of a remote minefield detection capability—one of the most important and difficult technological challenges facing our army today.

"We must move fast against the assault . . . They cannot be permitted to achieve their objective"

Counterobstacles. Here, as in countermine, the critical need to move quickly and without delay on the extended battlefield demands an ability in the combined arms team to breach and clear obstacles in stride. While the offensively oriented threat forces are not expected to make a great deal of use of prepared obstacles, the havoc of war on the integrated, conventional, nuclear and chemical battlefield will sever roads and render large areas of terrain all but impassable through contamination, tree blow down, and rubbling, Again, we need battle drills taught and practiced by the combined arms team to move rapidly through these obstacles. No delays can be permitted if we are to destroy the assault echelons quickly and penetrate to attack deep.

Counterobstacle tasks are similar to countermine—they include reconnaissance, detection and neutralization. Time is key and obstacles must be reduced under fire. Currently we have the Combat Engineer Vehicle (CEV) for this, although only a very few in each division area. With the addition of the M9 Armored Combat Earthmover to the force, we will have a significantly more mobile and survivable capability. Looking to the future, an improved—more powerful—CEV will help in the near term. Further along, there is a need for a dedicated Counter Obstacle Vehicle (COV) which can move and survive with the maneuver elements and remove or clear battlefield obstacles.

Gap Crossing. The tasks in gap crossing depend upon the nature of the gap—whether wet or dry—its width, the access and egress conditions, and the local battle condition. This last is critical, for a crossing under fire affects the speed of installation and dicates how survivable the crossing system and its installers must be. The nature of our combat materiel in the maneuver elements—its extremely limited fordability or swim capability—forces us to use crossing means to carry the heavy combat elements forward.

Again, the task of gap crossing is one that lends itself to combined arms drills. These need to be fixed and taught, and the supporting materiel altered or designed to fit the requirement. While much of our rafting and bridging materiel is excellent, the greatest equipment problem facing us in the future is that of the assault crossing for both light and heavy forces. It is a problem without a quick fix. The light forces need a mobile and strategically deployable wet and dry gap crossing capability which is survivable under battle conditions. Additionally, a more survivable assault wet crossing capability (probably using ferries on broad frontages) is needed for the heavy forces. It may be that an improved Mobile Assault Bridge or a modified ribbon bridge can fill this role. Finally, for the future, there appears to be a need for improved bridge mobility, which can be obtained through upgrading our current AVLB fleet, eventually going to the M1 chassis for AVLBs, and research and development to provide a method for longer and quicker dry gap crossing.

Through all the gap crossing task areas we need to continuously analyze whether we have sufficient means based on the Airland concept. Our assests now tend to keep our forces canalized in assault crossings rather than spread across a wide front at multiple crossing sites. We cannot afford the probable damage the enemy can inflict due to this "necking down" of maneuver elements at gaps to be crossed. Our entire range of combat equipment lacks an acceptable across-the-board swim capability. This forces us to have wet and dry gap crossing systems to supplement mobility. Additionally, the class load limit of our materiel is being pushed gradually upwards, which, if it continues, will overload not only most civilian bridges but all the fixed bridges in the inventory.

Mine Warfare. The interdiction, delay and disruption of the follow-on threat echelons is fundamental to success in the Airland Battle. One technology which makes this possible is the advent of the dynamic, remotely scatterable mine. Whether fused conventionally, magnetically, or in some other fashion, and whether preprogrammed to self destruct or not, this capability is key to the disruption of enemy mobility. Conceptually, the entire arena of these new mines poses significant questions. Should they be marked, reported, or otherwise controlled? Who has placement authority? How do these questions apply to self-destruct versus conventional mines? What percentage should be placed by artillery? By air? By ground system? All of this is the subject of ongoing work to develop an approved mine warfare concept. Crucial to the use of mines is speed and proper site selection.

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Our currently fielded emplacement techniques are slow and labor-intensive. Conventional mines are heavy and logistically burdensome for transport and storage. Marking and recording systems need to be fast and simple, and responsive to the maneuver commander's need to know.

The new artillery and air delivered mine systems—the RAAMS, ADAM and GATOR—will be key tools in the Airland Battle. They make deep interdiction possible and are fundamentally important to how we must fight. It is important, however, that we do not overload these valuable delivery systems with close-in mine warefare missions which can otherwise be accomplished. Other ground based mining mechanisms such as the Ground Emplaced Mine Scattering System (GEMSS) and the Modular Pack Mine System (MOPMS) need to be fielded. For the future, we need an improved conventional mining capability and a universal mine dispensing system which can be mounted for employment on air or land transport. Lastly, and very significant to both our own mobility and countermobility functions is the control and integration system requirement for mines as well as other obstacles, which must emphasize "real time" reporting and mesh with command and control systems being fielded.

Like mine warfare, the tasks of obstacle development include emplacement, execution, and recording. Obstacles can be created in many ways using explosive or mechanical means. The development of obstacles and use of mines to delay and disrupt the enemy's assault echelons so we can absorb his first blow and hold him in the planned target areas—thus extending time—is fundamental to the Airland battle. Today's obstacle execution is also slow and labor intensive. Explosive cratering or excavation is often difficult to control. Non-explosive excavation by earthmoving equipment is slow and must be done with equipment which today lacks battlefield mobility and survivability. Also available are the aging atomic demolitions (ADM), subject to the entire array of political constraints, maintenance and training headaches, and deployment difficulties. The entire question of the applicability of our current ADM is under study.

Conventional explosive technology offers the best near-term solution to the effective quick execution of obstacles. The combination of inert components into a powerful blasting slurry—blasting agent, XM268 — provides an explosive with 1½ times the excavating energy of TNT. By preemplacing underground pipes horizontal to the ground surface, large antitank ditches may be created quickly by filling the pipes with blasting agent and detonating. This greatly reduces manpower requirements and produces fast results. Other agents, such as nitro-methane, are also under study. For point obstacles, such as cratering roads, the M180 cratering charge is a valuable tool. It is being fielded.

Non-explosive obstacle digging will be improved with the survivable M9 which can move with the maneuver elements. For the future, the M9, as well as the entire range of explosive technology, will greatly improve our ability for quick obstacle emplacement.

Survivability. The mass, momentum and surprise of the opening threat strike must be absorbed. To absorb this first blow, our fighting elements must be protected so that they can destroy the assault echelons, counterattack decisively, and move to the offense. To a greater or lesser degree, almost every element of our force in the Airland Battle must be protected—decisive for this is the question of who digs in the force, and, admitting a limited digging capability, who will be dug in first? Competing requirements for digging include our maneuver elements prior to the first day of battle, the fire support elements, and command and control centers. To the rear, logistic support also has a critical need. Whether a digging capability should be organic to all or a part of the combined arms team or centralized in the engineer elements is a derivative question. The fact that emerges clearly, however, is that our digging capability must have a compatible mobility with the maneuver elements—it must be there when needed. There will be no time to wait. While the current D7 bulldozers and JD410 backhoes are excellent diggers, they have neither the mobility nor the survivability to do the job in the main battle area or covering force area. Here we need a mobile and survivable digger—the M9 ACE. For smaller emplacements, especially for our light force, the Small emplacement Excavator is needed.

The preeminent need which runs through all the M-CM-S tasks is that the executing force must have speed, survivability and deployment capability. These are fundamental requirements for any combined arms team member. Additionally, combined arms battle drills must be written, taught, and drilled on if we are to do the especially tough jobs of countermine, counterobstacle, and gap crossing—under fire. These battle tasks cannot be viewed as solely the realm of the combat engineer. While the engineer member of the combined arms team remains the commander's principal executor and advisor, he cannot do the job alone. These are tasks for the entire team, and without the team approach of practicing and training together we will not be able to move, block the enemy, nor survive to win on the battlefield. We must retain mobility to fight outnumbered and win. We must see deep and delay, disrupt, canalize, and block the follow-on echelons early by all means available, and we must be capable of absorbing and holding the assault and finishing the fight if we are to defeat the assault echelons. This requires a total integration of combat power and demands that we achieve mobility, countermobility and survivability in the Airland Battle.

MEMS SPR•81

Symbol of the 1981 Systems Program Review

THE 36TH ENGINEER GROUP

by Col. Frederick E. Bittl

The 36th Engineer Group (Combat), now located at Fort Benning, Georgia, was organized over forty-seven years ago, and fought with distinction in World War II, and the Korean War. Constituted on 1 October 1933 in the Regular Army as the 36th Engineers, it was activated at Plattsburg, New York on 1 June 1941. It was redesignated as the 36th Engineer Combat Regiment on 1 August 1942, and after undergoing several reorganizations, was finally redesignated as Headquarters and Headquarters Company, 36th Engineer Group.

Members of the 36th Engineer Group boast of their unit being one of the first engineer units to train in amphibious tactics. A seahorse on a red and white shield constitutes the unit's distinctive insignia, and is worn proudly by the Group's members, proclaiming to the world the prowess demonstrated during the many amphibious assault landings made by members of the 36th Engineer Regiment in European Campaigns of World War II. The Group's colors carry nineteen battle streamers with five bronze arrowheads representing five amphibious assault landings.

During World War II, the unit performed all types of combat engineering and was committed as Infantry on several occasions. It helped take the Army into North Africa in November 1942, and operated invasion ports. In July 1943, the 36th went into Sicily with General Patton's Seventh Army. With Sicily conquered, General Clark wanted the 36th assigned as a corps combat regiment with the Fifth Army for the Italian Campaign. At Salerno they were in the line fighting off the counterattack, which the Germans openly boasted would throw us back into the sea. They bridged the Volturno at a place they called the Boresight Bend, as the Germans in the hills were looking right down their rifle barrels at them. At Anzio, for fifty consecutive days, the 36th was committed as Infantry, and held a 7-mile sector of front line around the beach head. The Germans started calling them the Little Seahorse Division, because through some oversight in the War Department, this engineer unit was still wearing a seahorse shoulder patch which was adopted during its amphibious training period. General Mark Clark's recommendation for the award of Combat Infantry badges to the men of the 36th was turned down because of the War Department policy restricting the award solely to Infantrymen. However, General Clark wrote the 36th a farewell letter when it sailed for France. He wrote, "The record which you have established with it (the Fifth Army) since D-Day at Salerno, is indeed an enviable one. During the crucial days on the beaches in September (1943), during the advance to Naples, to the Volturno, and to the enemy's mountainous winter line, you comported yourselves in accordance with the very finest traditions of the Corps of Engineers."

It was the 36th Engineers who helped put the Seventh Army into Southern France, and when the Seventh Army sped north from Marseilles, the 36th collected its arsenal and went along. By the time the Seventh was moving through the Rambervillers Sector, the 36th was in the line again, fighting as Infantry, a sight to behold. Not being officially Infantry, the 36th was free to choose its own weapons, American or captured German. Its heavy-weapons section carried every kind of "Shooting Iron" except field artillery. On New Year's Day 1945, it assembled as Infantry on two-hours notice to meet the German attack in Alsace-Lorraine.

The 36th never made it to the Pacific during World War II, but it did arrive in Pusan in October 1950 at the beginning of the Korean Campaign. While assigned to the IX Corps, the Group fought the toughest foe in its history—the Korean weather. Road construction and maintenance in the corps area were the primary mission, and their accomplishment was obstructed continuously by the elements. In the winter of 1951-1952, new roads and bridges were built through rugged mountainous terrain. Equipment and men were punished severely by the sub-zero temperatures and frozen ground. In November 1951, the units of the 36th Engineer Group carried assault troops across the Pusan River, built 1,236 feet of treadway bridge, punched 6-miles through rough mountainous terrain, and transported tons of supplies by water to insure the success of the operation.

The 36th Engineers served continuously in Korea from their arrival in Pusan in October 1950, until May 1972 when the unit's colors were returned to the United States. For its service in Korea, the 36th Engineers received the Republic

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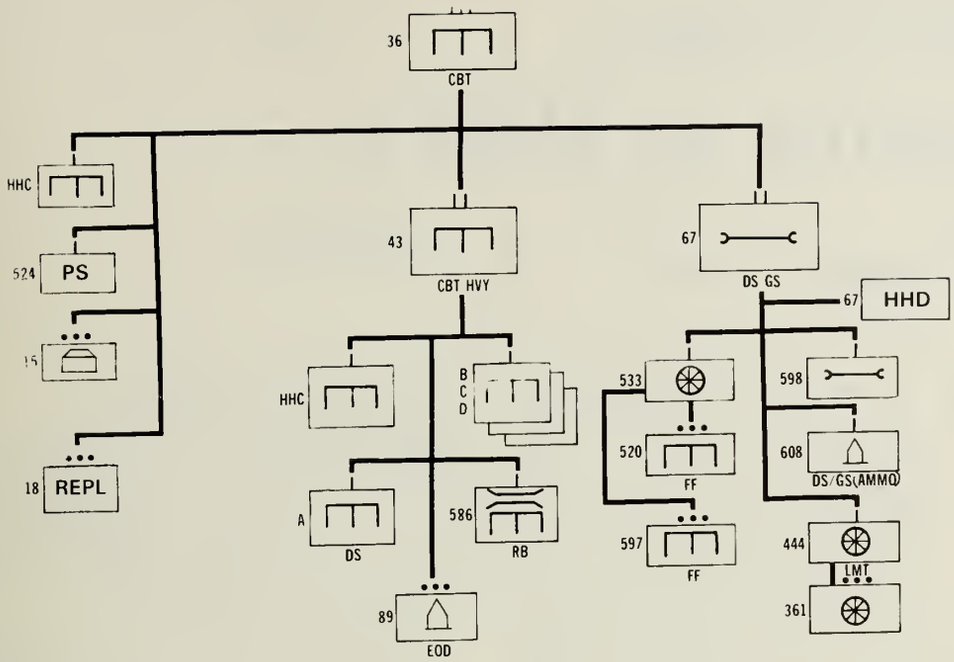

of Korea Presidential Unit Citation, and two awards of the Meritorious Unit Commendation.

The 36th Engineer Group (Combat) was reactivated 1 July 1973 at Fort Benning. It is quite ironic that this engineer unit, which spent so many days fighting as Infantry, should be assigned to Fort Benning—The Home of the Infantry.

The peace-time mission of the Group, briefly stated, is to support the US Army Infantry School and Center, and to be prepared to commit forces in support of the Unit's contingency mission. On the surface this seems to be a rather simple, straight-forward mission until we look at the Group's extraordinary organization. Extraordinary, in that approximately only 50% of its assigned personnel are Engineer soldiers and that the Group has Engineer, Ordnance, Transportation, Adjutant General, and Finance units assigned. Support of the Infantry School and Center involves all aspects, including operating a replacement detachment, finance operations, ammunition handling and transportation, maintenance, construction, and the 89th Ordnance Detachment even provides assistance to the Secret Service in protecting the President of the United States.

The 43rd Engineer Battalion, the only engineer battalion assigned to the Group, has provided considerable construction efforts to the Center over the last year. Major construction projects of the battalion include the construction of a sub-caliber tank range, a mechanized infantry assault training course, a military operations in urban terrain (MOUT) site, and a 4,000 foot assault landing strip. In addition to its organic organization, the 43rd has the 89th Ordnance Detachment, and the 586th Engineer Company (ARB) attached. The 89th Ordnance has the responsibility for providing Explosive Ordnance disposal in the southeastern portion of the United States. It has been called upon on numerous occasions to assist the Secret Service in providing security for visiting dignitaries.

The 586th Engineer Company, which is equipped with the Ribbon Bridge, is very active in keeping itself Combat Ready and ready for deployment. The 586th is a shining example of a highly trained and motivated unit. It is not unusual to find it "on the road" traveling to Fort Bragg or to Fort Campbell to support training or to participate in FTX's.

The units of the 67th Maintenance Battalion provide support not only to units of the Group, but the 598th Maintenance Company provides vehicle, small arms, and electronic maintenance support to other units and commands on Fort Benning. The 444th Light Truck Company performs all of the ammunition hauling in support of the Infantry School. The 608th Ordnance Company (Ammunition) provides support to the Directorate of Industrial Operations for operation of the Fort Benning Ammunition Supply Installation. The 67th is also in the fire fighting business in that it has two attached Fire Fighting Detachments who provide support for the Ranger Camp in Florida.

As difficult as the day-to-day missions are in support of the Center, planning and conducting training in preparation to meet the wartime missions are certainly more difficult due to the varied units assigned. Imagine, the Group must, on its own, plan and conduct eight separate and different company ARTEPs and assist in two battalion ARTEPs. As FORSCOM units, quarterly FTXs are required of each unit, weapons qualification, EDREs, and NBC training must be conducted without interfering with the vital support to the Infantry Center.

New Countermine Capabilities Emerging in 1980's

by Maj Marion C. Miller

Editor's Note: The entire countermine function—from doctrine through hardware and tactics—has been undergoing an intensive review by the whole combined arms team. Launched by the recent Mobility-Countermobility-Survivability Systems Program Review at Fort Belvoir, we engineers along with the armor and infantry are systemically examining what countermine tasks need to be done on the battlefield. This article addresses a number of hardware items each tailored to some specific tasks. Lacking is the overall systemic grouping—perhaps, extending one's mind—one machine, robotically controlled, which can detect, neutralize, clear, proof and mark a minefield—all in one! In August of this year, the Engineer School launched a telescoped two to three year effort to field such a countermine first generation system. Progress will be reported in detail in subsequent issues.

The radio cracked as the message came across. "Two one, we've hit a minefield enroute to Checkpoint Delta. Estimated depth—80 meters. Lost one track. No casualties. Request further instructions."

The commander realizes the unit has no other alternative but to breach the minefield. Bypassing it in that area would delay him still further. Luckily the minefield is not under direct enemy fire. He gives the order to breach.

At Checkpoint Delta, the platoon leader puts his APC's and support tanks in defilade positions to provide covering fire if necessary. He then organizes his men to breach a lane in the minefield. Out comes the tools of the trade: the ANPSS-11/ANPRS-7 handheld detectors, bayonets and hand probes, and TNT/C-4 to detonate the mines in place. Only two hours later does the call come, "Two one, lane cleared and marked. Prepared to move out."

The Korean War, 1952? . . . Minefield breaching operations characterized by slow, dangerous, labor-intensive work? No, this is the year nineteen-hundred and eighty-one! This brief situation characterizes the current fielded state-of-the-art in minefield detection/breaching in the US Army today. (The Army does have some explosive line charges but they are very limited in number, remain in stateside storage, and units are not training with them. These include approximately 550 serviceable M157 (Diamond Lil) rigid, tank-pushed, line charges and 360 rocket-propelled, sled-mounted M173 line charges.)

It is a well-recognized fact that the Army's countermine capability in the field has been relatively unchanged since the Second World War. However, as this article will point out, we are not in as bad a shape as one may believe. A number of new items will 'graduate' from the development school R&D over the next few years, which will significantly upgrade our capabilities. The real question, though, is whether the Army will fund full-scale production of these countermine items, as they compete with everything from the M1 tank to night vision goggles for limited procurement dollars.

This article will look at those new countermine systems capable of being in the field in the 1980's which would support the new Army 86 force structure, which by the way was very aptly described in the June 1981 issue of ARMY Magazine. After discussing the characteristics of each system, we will look at the same minefield obstacle problem to see how the 1986 commander might then handle it.

Figure 1 tabulates the hardware by acronym as to capability (detect/neutralize) and development status. "Advanced" is merely a special category to indicate that certain systems are far enough along in development that they could be fielded in an expedited manner should a national emergency or a declaration of war occur. A system "splitting the line" exhibits both a detect and a neutralization capability.

A major short term improvement in detection has been in upgrading the capabilities of the AN/PRS-7, hand mine detector, however, the AN/PRS-7 was designed as both a metallic and non-metallic mine detector. However, a product improvement was initiated to correct an operational deficiency in identifying non-metallic mines in arid soil conditions. The improved PRS-7 (designated the AN/PRS-8) has increased non-metallic detector rates in tests from 8% to greater than 83% in dry soils. Other human engineering system improvements include the addition of a metronome pacing signal to set the optimum sweep rate, a chest strap for distributing the weight to reduce operator fatigue, and more distinctive audio "Clicks" to assist in mine identification. Over a 31 month period beginning later this year, a recall will be initiated to retrofit the AN/PRS-7 in the field and rename it the AN/PRS-8.

The only new item in mine detection scheduled for fielding in the 1980's is the ANVRS-5, vehicle-mounted road mine detector. It is designed to fit on the front of any standard army vehicle from a ¼ ton jeep up to an M113.

The device is principally designed for use over roads, but can also be used over flat, sparsely vegetated terrain. The device can be used at speeds of 5-8 mph, (considerably faster than the

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	DETECT	NEUTRALIZE
Fielded	AN PRS-7/8 AN PSS-11	Bangalore M157 M 1 7 3
ADVANCED DEVELOPMENT	ANVRS-5	SLUFAE MICLIC POMINS ROLLER VEMASID
EXPLORATORY DEVELOPMENT		CLEWP TW-PLOW FW-PLOW DOZER

Figure 1. 1981 Countermine Program Status

hand-held detectors), over a width of 6-11 feet. Once a mine is detected, the system gives off both an audio alarm as well as provides a visual indication on a video-screen of the mine's exact location under the antennae search heads. The vehicle operator must stop when he hears the audio alarm. Once detected, the mine then must be neutralized or bypassed. The system uses the latest microwave and microprocessor technology. It also represents a major technological breakthrough in that it can detect both metallic and plastic mines with a low false alarm rate. The ANVRS-5 will be issued to engineer, armor, infantry and field artillery units on the basis of 2 per battalion, one per separate company. It should reach the field by 1985.

Mine Neutralization

By the spring of 1982, the first Track-Width Mine Rollers will be arriving in Europe to upgrade the mine neutralization capability of armor units. An additional 80 are scheduled to be procured in 1983 also for Europe. The Mine Roller will give tank units, for the first time, an organic capability to breach a minefield. The Roller, mated to an M60, is designed to survive the blast effects of the least two consecutive anti-tank mines, each containing up to 25 pounds of high explosives.

Under battle conditions it can be mounted on the tank in less than 15 minutes and released remotely from within the tank in less than 30 seconds. At a breaching speed of 10 mph, it is 90% effective in neutralizing single impulse pressure type mines. The Mine Roller will be issued 3 to a tank battalion.

Fielding the Surface Launched Unit Fuel-Air Explosive (SLUFAE) in 1986 will provide the Army with a significant new countermine option. Field units will have the capability to create a breach of a known mine field from a stand off distance of more than one-half mile. Intended primarily for assault breaching of defended enemy minefields. it is the only minefield breaching system in the world with such a standoff capability. With SLUFAE, the minefield can be breached while the combined arms task force is moving rapidly forward to exploit the breach.

SLUFAE consists of a 30-tube launcher, mounted on an M548 full-tracked cargo carrier. A Resupply Vehicle (RV) with on-board crane is, used to load the rockets and supports the system. The fuel air rockets can be fired individually or in ripples from concealed positions in all types of weather during daylight or darkness.

All Operational and Development testing on SLUFAE was completed in 1980. However, the Army has delayed production funding for the system until 1984. SLUFAE launchers will be issued two per engineer company in armor, and mechanized divisions.

By 1985 the Army will have a trailer-mounted, Mine Clearing Line Charge (MICLIC), which will be used to complement the SLUFAE system in breaching minefields where standoff distances are not required. Once a minefield is encountered, the MICLIC is pulled forward behind a tank or armored personnel carrier to within abouit 50 meters of the edge of the minefield. The line charge is then fired over the combat vehicle, creating a breach 100 meters long by 8 meters wide, while the crew remains buttoned up within the vehicle. If a longer breach is required, a second MICLIC is pulled forward and fired from within the breached lane. The trailer can be released on the spot or dropped at a preselected position for recovery and reloading.

The current line charge under evaluation to meet the Army's MICLIC requirement is the Marine Corps M58A1 trailer-mounted line charge. The MICLIC will be issued two trailers per engineer company in divisions, separate brigades, armored cavalry regiments and corps.

In order to counter the potential threat posed by magnetic impulse fuzed mines, the Army will field the Vehicle Magnetic Signature Duplicator (VEMASID) in. The VEMASID is an easily attachable/detachable coil device which can be mounted on selected combat tracked vehicles such as the M113, M60, CEV, IFV, CFV and the M1. The system is designed to project a magnetic field forward of the vehicle. This magnetic field resembles a tank-like signature, thereby harmlessly exploding any magnetic mines before being encountered by the vehicle.

The VEMASID system can be used with other mine countermeasures, such as the mine roller and track width mine plows, to provide the capability to defeat all type mines. Even though the Soviet Union and Warsaw Pact countries have no known magnetic mines, the technology for development is

readily available. At least three foreign countries are selling magnetic mines on the international arms market. Furthermore, US scatterable mines are also magnetic. The proposed basis of issue for VEMASID is one per CEV plus one per platoon engineer, armor, and mech infantry units.

A final system in advanced development is the Portable Mine Neutralization System (POMINS). It is used to neutralize antipersonnel (AP) mines, booby traps, and wire obstacles for the dismounted combat soldier. The system, weighing 58 pounds, is back-packed by a single man and is primarily designed for ground attack of bunkers and strong points by light forces. It can be set up and fired in less than a minute and clears a path 0.6 meters wide by 25 meters long. Soldiers can then quickly move through the breach and continue forward to attack positions on the far side of the obstacle.

Additional systems in exploratory development should also be mentioned. These systems are all geared to providing armored units with additional organic minefield breaching capabilities. This is important on the extended battlefield, especially in cases where engineer support may not be readily available in a fluid encounter.

Several specific items are being developed for potential use and adoption to the M1 main battle tank. These include a Track-Width (TW) Mine Plow and a Full-Width (FW) Dozer Blade. A special "universal" adaptor s also being developed so that all these hardware items can be attached to the M1 at the same existing hardpoints on the M1 glacis.

The Track-Width Mine Plow is a relatively light weight system designed to be carried on the tank at all times. It is capable of physically extracting, neutralizing and removing land mines or booby traps located on the surface or buried in 4 to 6 inches of soil. The easily identifiable cleared path can then be followed by other follow-on assault vehicles. A "dog bone" and chain assembly activates any tilt rod mines located between the tracks. The Plow can be raised or lowered from within the tank.

There are currently no plans to field the Track-Width Plow for any combat vehicle other than the M1 and the CEV. Use of the Mine Plow will give maneuver units the organic capability to breach known minefields as well as chance-encountered scatterable surface-laid mines without significant difficulty of loss of momentum. The Plow will be used in attacks on enemy positions which are known suspected to be protected by minefields, in armor thrusts or pursuit deep into enemy areas where minefields are known or expected to exist, and when scatterable mines are a probable threat. The TW Plow could be in the field by 1986 on the basis of one per armor platoon.

The Full-Width Plow is a relatively new developmental item. Its principle design requirements are to be light in weight, not obstruct the operator's vision in a carry or operational mode, and be capable of principally pushing aside light/surface rubble and surface-laid or scatterable surface mines. Any digging capability will be minimal.

The Full-Width Dozer Blade is being modeled after a foreign developmental item and could also reach the field by 1988. It will provide a digging and leveling capability to allow the M1 to go places it cannot not go, or to take better advantage of the terrain. It is envisioned that the dozer blade would be attached to an M1 on a mission basis only and issued one per armor company. The dozer blade can be used to breach tank ditches, natural terrain obstacles, battlefield rubble, and minefields. With its digging capability, it can also construct defilade or defensive positions.

All four of these M1 hardware attachments are being developed as a one-of-a-kind item to determine their compatibility with the M1. Based upon test results during 1982, decisions will be made as to what further design modifications need to be made and which hardware items should be further developed for the M1.

A final neutralization system which could be fielded by 1986 is the Cleared Lane Explosive Widening and Proofing (CLEWP) charge. The system being considered was developed by a foreign government and uses an explosive line charge, mounted on the rear of the breaching armored vehicle. It is designed to be used with the Track-Width Mine Plow or Mine Roller. As the breaching vehicle approaches the near edge of the minefield, the lid of the explosive container is ejected. The explosive line charge is attached to the lid, which serves as an anchor, and is unraveled as the vehicle proceeds throught the minefield. When fully extended, the charge is then detonated, thereby widening the initial breach and proofing it.

The CLEWP system is an important new capability that the US does not currently possess. The advantage of this system over rocket propelled line charges is that it can be accurately emplaced in the exact breach lane of the initial assault vehicle in a continuous forward movement mode. CLEWP will be a Class V ammunition item to be used by engineer, armor, and armored cavalry units.

That concludes the possible graduating systems which could reach the field in the 1980's. So, let's now see how our platoon leader now tackles the minefield at Checkpoint Delta.

The year is 1986. As he is not under fire, the platoon leader elects to breach one lane with a MICLIC while other lanes are made by assault vehicles mounted with Rollers/Plows/VEMASID and CLEWP attached to widen and proof the breaches. Ten minutes later comes the call, "Two one, lanes cleared and marked. Prepared to move out."

If the platoon had been under fire, the platoon leader would first call for smoke and counterbattery fires to deceive the threat and decrease the threat's ability to use remotely delivered scatterable mines to reinforce the mined area. Then he would proceed with the breaching operation as before.

Let's look at one more situation to emphasize our new flexibility and system capabilities. The unit has so far been able to bypass all known minefields. But now at Checkpoint Charlie, scatterable mines, previously undetected or recently delivered, are suddenly encountered.

If this were 1981, the leaders options would again be to bypass, bull through, or methodically clear lanes by hand. But since this is 1986, he has his lead elements organized and outfitted with organic, close range minefield breaching systems such as Rollers, Plows, CLEWP and VEMASID, just in case such unexpected or undetected mines were encountered. Counterbattery fire is immediately initiated so suppress delivery of additional mines, and smoke is employed to both deceive the threat and defeat his target acquisition systems. An assault breach is initiated by quickly clearing lanes with Track-Width Plows and Tanks with Rollers and CLEWP attached. The remaining combat vehicles follow rapidly through the breached lanes. The chance-encounter minefield thus no longer creates a significant obstacle to force momentum.

This brief summary has highlighted the Army's emerging countermine systems in the 1980's. Fielding these added capabilities will allow our force structure to move, fight, and win on the extended battlefield.

There are many other exciting developmental items and ideas in R&D, with such "catchy" titles and WAND, AMIDS, MIDURA and Super Serpent. As ideas and technology combine to take a more definitive shape in the future, you will hear more of them.

Persons or organizations interested in obtaining additional information on the Army countermine systems, should contact the Directorate of Combat Developments, USAES Ft Belvoir, VA 22060.

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Engineers at Yorktown

The last great battle for American independence

Reprinted with permission from The Military Engineer

by James N. Hasket

Though crude by today's standards, the warfare of the American Revolution relied as heavily upon the military engineer's expertise as does contemporary combat. The campaign leading up to the seige of Yorktown, Virginia, in 1781 offered the greatest challenge to the engineers of all the armies. They were called upon to support extensive and complex troop movements and then to direct both defensive and siege operations. Whether they were French, British, or American, their energies and skills would be taxed to the fullest before the hostilities ended.

The burden of responsibility was disproportionate to the number of individuals upon whom it was placed. For in the 18th Century the title of Engineer was not casually bestowed. Of the 25,000 men engaged at Yorktown, less than two dozen were so designated. They truly represented an elite group.

Opening the campaign

In the late summer of 1781, Lord Cornwallis' British Army seized the ports of York and Gloucester on the York River in Virginia. These were located at a narrow point in the river where a British fleet could anchor ships well protected by shore batteries. Fortifications were quickly begun at Gloucester and somewhat more leisurely at Yorktown. Cornwallis had abandoned his position in the Carolinas and moved to Virginia in the spring. Here he assumed command of a force already raiding in Virginia and consolidated it with his own. Throughout late spring and early summer, his force destroyed military supplies and installations throughout eastern Virginia. His raids were hampered somewhat by a small force under th Marquis de Lafayette, who was sent to Virginia by Washington.

Washington, though cherishing the hope of recapturing New York, the site of some of his worst defeats, moved quickly when he learned that a large fleet under Admiral de Grasse was en route to the Chesapeake Bay with a sizable infantry reinforcement and badly needed funds. In co-operation with General Rochambeau commanding the French Expeditionary force, he worked out a plan of action. The combined armies feinted against the British stronghold in New York City and then moved rapidly southward to concentrate against Cornwallis.

Admiral de Grasse arrived in the Chesapeake Bay and disembarked some 3,200 troops under General St. Simon. When a British fleet under Admiral Graves arrived off the mouth of the bay, the French fleet moved out to engage them. Though the battle which followed was not decisive from a naval point of view, the French re-establishment of the blockade of the bay would prove to be. While the fleets moved southward after the battle observing each other, another French fleet under Admiral de Barras slipped into the bay. It brought from Newport, Rhode Island, the vital heavy artillery of General Rochambeau.

The blockade secure with the return of the British fleet to New York, De Grasse dispatched vessels to assist the fleet of American coastal vessels bringing Washington's and Rochambeau's armies from Head of Elk, Baltimore, and Annapolis. These forces soon began to arrive, reinforcing the troops of St. Simon and Lafayette already assembling at Williamsburg.

Since the arrival of the French fleet, Cornwallis had been working to prepare the defense of Yorktown and Gloucester. The burden of this activity fell heavily upon the British engineers. Since making the recommendations that led to the sites' selection, they had carried out a variety of assignments. This stretched thin the very small engineer unit with Cornwallis' army, which consisted of First Lieutenant Alexander Sutherland, Principal Engineer, and Second Lieutenant James Stratton,

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Maj. Gen. Louis LeBegue DuPortail
Chief of Engineers 1777-1783

Practioner Engineer. As the danger increased, the detachment was augmented. On September 3, Lieutenant Chapman of the 23rd Regiment was appointed to act as an Assistant Engineer. Seventeen days later Lieutenand Dunn of the 63rd Regiment received a similar assisgnment. Dunn would later die of wounds received in the fighting, the only casualty in this group. Sutherland had arrived at Yorktown to survey the area and prepare a plan for fortifying the posts of Yorktown and Gloucester. Stratton stayed at Portsmouth to oversee its evacuation and leveling.

Spades, shovels, and pickaxes

The tools available to the approximately 8,000 troops of the British and perhaps 2,000 slave laborers represent a striking contrast to the equipment available to the modern combat engineer. An inventory taken in August of 1781 showed 400 spades and shovels, 190 pickaxes, 160 hand hatchets, 200 felling axes and 32 wheelbarrows on hand for fortification construction. The engineers would not only be faced with an area not selected with a land defense in mind and troops unaccustomed to the southern climate and diseases, but also a shortage of necessary tools.

The organization of the French and American Corps of Engineers was more unusual for its similarities than for any differences. This is due primarily to the enlistment of virtually all Corps members from the French Royal Engineers. Throughout the entire war there would be only one American serving in the American Corps of Engineer's which was commanded by Brigadier General Louis Le Begue du Portail, on leave from the French Royal Corps of Engineers. During the Seige of Yorktown there would be present three American Engineers including the commander. The French engineers would be under the over-all command of Colonel Desandrouins. However, he fell ill and had to remain at Williamsburg during the entire operation.

Upon arrival before Yorktown, the engineers of the two armies were consolidated into three divisions. Though the divisional structure was not fully adhered to in the initial stages of the action from the 9th of October forward, it was utilized with the members of the division being assigned in unit groups only.

Because the engineers were few in number, they needed support, particularly during the complex siege operations. Each army approached this problem in a different manner, though all had specialized units which could do much of the siege warfare routine.

With the exception of the pioneers and carpenters who supported the operations of the line units, the British had developed no units throughout their army capable of supporting siege operations. However, there were exceptions. While at Portsmouth, Cornwallis wrote his commanding officer that the variety of fatiguing services demanded of the pioneers obliged him to augment the detachment to a company of 50 men commanded by Captain Ebenezer Brown. Even this is confused by the orderly book entries and surrender returns. At the capitulation the pioneers listed two Captains, three Lieutenants, four Sergeants, and only 33 rank and file. Shortly before this, it was ordered that a portion of the recently enlisted pioneers were to be discharged. Whether this accounts for the high ratio of officers to men remains for more research to reveal. However, there are frequent references to the Black Pioneers. The genealogy of the British Army notes that the 33 rank and file pioneers surrendered at Yorktown were negroes and were used to form the nucleus of the First West Indian Regiment.

The French incorporated their specialized troops into their artillery regiments which consisted of two battalions composed of ten companies. One of these companies was the Sappers, used for the specialized siege activities and similar duties.

In the American Army, regulations had established several companies of Sappers and Miners composed of experienced troops trained in both the basic military skills and in the conduct of the siege. Their company grade officers were selected for their experience and background in the rediments of engineering.

The greatest difference in the various units seems to have been in their place in the organizational structure. While the British and French units were incorporated into the line organization, the Sappers and Miners of the American Army were under the direct command of the engineers. In addition to the skilled support of the specialized units, all armies used their rank and file in routine construction and siege activities. At Yorktown, the British would also use large numbers of slaves captured throughout the community on their works.

The investment of Yorktown

When their concentration at Williamsburg was complete, the Allied American and French forces marched towards Yorktown on September 28th. By evening they had swept aside any limited resistance and loosely encircled Yorktown. The next day the investment was further perfected. It was discovered on the morning of September 30th that Cornwallis had abandoned his outer works during the night and retained only the actual defenses of Yorktown, the Royal Welch Fusiliers Redoubt upstream, and Redoubts 9 and 10 downstream.

To ensure that Cornwallis would not suddenly debouch from Yorktown, the Allies reverse captured works and constructed others in a line of containment. They also located their camps in a loose circle to provide forces at any point of the perimeter if it were attacked.

From the early stages of the concentration, Washington feared that the British would cross the York River and move northward. He ordered a concentration of the Virginia Militia at this point. This force was reinforced first by the French Legion of Lauzun and then by a detachment of infantry from the fleet. Led by French General de Choisy, it then tightened its investment of the British defenses of Gloucester Point. While this sector would see minor skirmishes from this point on, it would not experience formal siege activity.

"Interesting lining on your flag here, Mister."

Preparation for the Siege of Yorktown

Through Cornwallis had eliminated the danger of a French fleet-supported waterborne flank assault and reduced the amount of work needed on his defenses, his withdrawal gave the Allies a great advantage. They could begin their assault upon his main defense line without first reducing the outer works and could also concentrate the bulk of their men and firepower in a relatively small segment of the perimeter.

The upriver section of the Allied front rested on a plateau which extended from the York River to the Yorktown Creek Marsh. The tip of this triangular high ground was controlled by the Royal Welch Fusiliers' Redoubt. The wide marsh encircled the north and west of Yorktown. From the Yorktown Creek drainage there stretched a relatively wide flat area to the York River. The latter area was accessible from a series of ravines caused by the Wormley Creek or Yorktown Creek.

Though the engineers had responsibilities for mapping the access routes into the area, laying out temporary fortifications, forwarding entrenching tools, and countless other duties, the most demanding period of their craft was ahead. This involved the planning and execution of a formal siege.

During the next few days they reconnoitered every inch of the access to Yorktown until they decided upon the best approach. This involved not only the best utilization of topography, but also the careful analysis of the British ability and desire to resist. They also defined the amount of siege materials necessary to erect fortifications and where they should be stored to best support the forthcoming operations. Their work was impatiently watched by Washington. He and General du Portail advanced to within 300 yards of the British works to obtain an estimate of the situation. Washington knew what the British were assembling a relief force in New York and that time was of the essence. While he hoped to open trenches on October 1, it would be several days later before this was possible.

It was decided that the siege lines would be opened simultaneously across the neck before the Royal Welch Fusiliers' Redoubt and from Yorktown Creek across to the York River. By the evening of October 6th, all was in readiness. The lines laid out by the engineers were marked by strips of pinewood laid end to end. the British patrols had been driven off by vigorous Allied patrols and outposts. Fifteen hundred workers with tools and trenching materials were assembled with 2,800 men under arms to be stationed nearby to protect them from a British sortie. Two engineers were assigned to the upriver sector and four to the larger downstream sector. The workers went to work with a will. The soil was soft and sandy, the night dark with a gentle rain. All seemed to favor the Allies, but the troops had to be under cover by dawn.

The British did not detect this activity to their south. However, in the upstream sector they had been warned by a French deserter. Here they kept up a heavy fire. The few casualties of this evening would occur here.

By dawn the British learned the extent of the works erected against them and opened an angry fire. However, the working parties were now under cover and protected.

From this point forward, the Allied effort would grind inexorably forward. Work party would follow work party into the trenches night and day. Those troops not working would be producing more entrenching materials or resting. Now within 800 yards of Yorktown, the Allies worked to perfect this line. Redoubts were added to house infantry supports and batteries constructed for the siege artillery. All the Allied activities were carried on with a careful eye to the nearby British. Cornwallis was known as an aggressive commander. His large force of experienced troops represented a threat at any time that he decided to attack.

The Allies had encountered difficulties in forwarding their siege artillery and Washington was not going to commit it until he could achieve fire superiority. The French completed their first battery on the afternoon of October 9th. To reward their diligence, Washington ordered the battery which was located in front of the Royal Welch Fusiliers' Redoubt to open fire at three in the afternoon. Later that afternoon, Washington fired the first round from the Grand American Battery. During the next two days the remaining batteries on the first line were opened. The Allied superiority in quality of artillery soon became obvious. The British guns fell silent as their embrasures were closed or their crews decimated. The parapets of their fortifications began to crumble; the obstructions before them were frequently breached.

Resistance weakened

With the weakening of British resistance and the urgency of capturing Cornwallis before assistance could arrive, the Allies decided to open an even closer, or second, siege line. Early on the night of October 11th, the troops began construction of the second line approximately half the distance between the first works and the British. The second line could only be erected before the French sector of the main Allied siege line because British Redoubts Nine and Ten still held out. Though in the area of French responsibility, the troops of both armies were used to expedite the action. Because of the proximity of the British, the troops were carefully selected for this duty.

The morning presented the British with a line extending from Yorktown Creek to the upper drainage of Wormley Creek in the center of the line. Because the British downstream redoubts were contiguous to the new line, an epaulement or shoulder had to be erected to at right angles to the line to protect the workers from the fire from the redoubts. The erection of the works was difficult because the British, using light mortars, reopened a very heavy fire. The French found it hard to silence the British fire due to the difficulties of firing over their own working parties. Despite short rounds, they found it necessary to keep up a continual fire to suppress the opposition's shelling. Because of the threat of British sorties, the line was quickly strengthened by redoubts. Then batteries were begun to house the guns now firing from the first line.

The continued possession of Redoubts Nine and Ten by the British thwarting their efforts, the Allies decided to reduce them by night assault. On the night of October 14th, after being assured by the engineers that the British works had been sufficiently damaged by artillery fire, the French took Redoubt Nine and the Americans captured Redoubt Ten. By morning these were incorporated into the second line now stretching from the river to the marsh.

During the next few days the troops worked to perfect the new positions. The redoubts were reversed, new batteries erected, and communications completed. There was difficulty in moving the guns forward from the first line while keeping British fire to a minimum, but it proceeded according to schedule.

Despairing of relief, Cornwallis first carried out a sortie on the early morning of the 16th. This failing to retard the Allies, he then decided to extricate his elite troops by crossing to Gloucester, overwhelming the smaller garrison there, and escaping to the north. A shortage of transport and a sudden violent storm prevented this attempt.

On the morning of October 17th, facing Allied works recently completed, with more batteries joing the bombardment, Cornwallis decided to end the useless waste of his men's lives. He requested a parley. There was an exchange of letters, and the next day commissioners met to complete the terms of surrender. The following day the British troops marched out and laid down their arms. This event, marking the surrender of one-third of the British Army in North America commanded by England's best general, was to set in motion events leading to the nation's independence.

During the siege, the demands on the engineers of all armies were monumental. The professionals of two armies trying to capture an objective; the professionals of the third army seeking to prevent this through a skilled defense. That the strain was great is illustrated by General du Portail's illness at the end of the battle which prevented him from being present during the surrender to personally receive the credit due him.

Though there are some data on the contributions of all military engineers at Yorktown, the story is far from complete. This is unfortunate because of the importance of their role there. Many intriguing clues are available. This is an encouragement to the researcher but generally answers less questions than it raises. Perhaps one of the long-reaching benefits of the Bicentenial will be the uncovering of information leading to the full story of the contributions of these men to their nations. Certainly no one can deny that this tiny handful of men, whatever the color of their uniforms, played a major role in this truly significant American campaign.

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The Engineer Solutions

Military

There are many possible solutions to this problem, depending on the tactical situation. In this solution, Corps engineer units are attached to the Division, and further attached to the Brigades and Covering Force. The mechanized divisional engineers are also attached out to the maneuver forces. This gives maneuver commanders the flexibility to further attach, or direct support (DS), engineers to subordinate commanders as deemed necessary. The habitual association of divisional engineer companies to maneuver elements was followed, except in the case of 1st Brigade. A/52d was attached to the Covering Force, based on a well defined need in the CFA. It can be assumed that once the Covering Force battle is completed, A/52d will return to 1st Brigade support.

This solution also provides for a mix of the mechanized divisional engineers and the less mobile Corps engineers. It gives maneuver commanders the haul capability of Corps engineers (56 5-ton dump trucks per battalion) and the mobility and survivability of the Division's mechanized engineers. In the case of 3d Brigade, D/502d is OPCON to C/52d to ensure coordinated engineer effort in the 3d Brigade area.

The Brigade Engineer in 1st Brigade is the commander of C/500th Engineer Combat Battalion. In 2d Brigade it would be the commander of the 502d Engineer Combat Battalion, and in 3d Brigade, it would be the commander of C/52d Engineer Battalion, the habitually associated company commander. The commander of Engineer Task Force Red would be the engineer responsible for the Covering Force engineer effort. The 500th Engineer Combat Battalion provides the headquarters element for TF Red. This headquarters would probably consist of the Battalion XO and representatives from the various staff sections. The remainder of the 500th Engineer Battalion's headquarters would remain under Division control and plan for future operations.

This solution diverts from the "norm" of Corps engineer units being DS to a Division. If the Corps Engineer Combat Battalions were DS to the Division, they would have to be employed (according to FM 5-100, Engineer Operations) in a General Support (GS) role, since a unit that is in DS cannot be further subdivided. The problem with GS (and the centralized control that it entails) is that Brigade commanders are not assured of a timely response from Corps engineers in their sectors, even though they may have a recognized need for responsive engineer effort in their area.

Another problem which arises from the DS situation above is that of logistically supporting the Corps engineers as they move forward into the division area. Since these units are still under the command of their parent Corps unit, they must obtain their logistics through Corps channels. On paper, this is no problem. On the ground, however, Corps engineer units employed in the Division area often work great distances from their parent units so logistics support becomes more difficult as the distance increases.

Attaching Corps units to the Division eliminates the logistics problem since the Corps engineer units can receive support from the Division Support Command (DISCOM). The Corps Support Command, in turn, can send a slice of its assets to the DISCOM to account for the attached units.

One could argue that once the Corps engineers are attached to the Division they should be placed in DS to the Brigades (not the Covering Force), rather than attached. This option provides more centralized control of the engineer effort within the Division area and could be an acceptable alternative, depending on the tactical situation.

Civil

If we assume Volume of Solids equals 1.0, then Volume of Voids equals Void Ratio. Using this method, Pit B is most economical.

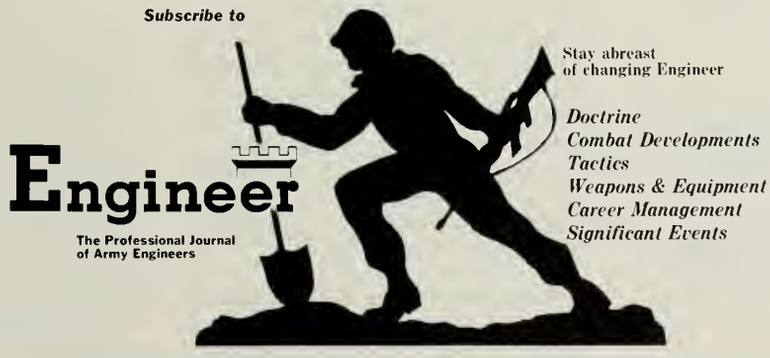
$$\text{Void Ratio} = \frac{\text{Volume of Voids}}{\text{Volume of Solids}}$$

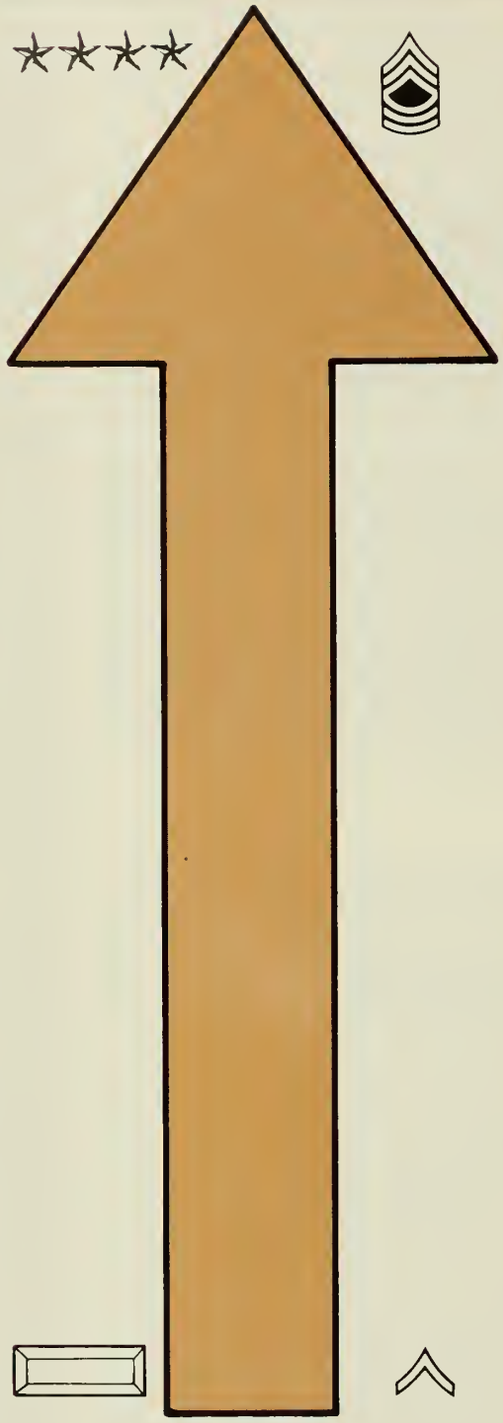
$$\text{Initial Total Volume} = 0.9 + 1.0 = 1.9$$

$$\text{Final Total Volume} = 1.7$$

$$\text{Total Cost} = \frac{1.9}{1.7} \times 4{,}500{,}000 = \$1{,}307{,}647$$

Pit A would cost $1,397,647, and Pit C would cost $1,389,706.





UPWARD MOBILITY

Special Weekend Courses for Engineers

The U.S. Army Engineer School, in cooperation with the Defense Mapping School here, conducts Special Weekend Courses for Engineer on Saturdays and Sundays. The courses are 12 hours long, and students planning to attend should have a job assignment or MOS that requires them to plan, conduct, or supervise unit training in the subject studied.

Course and course dates for fiscal year 1982 are: 3-4 Oct 81, Nuclear, Biological, and Chemical Warfare; 17-18 Oct, Medium Girder Bridge or U.S. Mine Hardware; 14-15 Nov Engineer Management or Engineers in the Offense; 9-10 Jan 82 Roads and Airfield in the T/O or Engineers in River Crossing Operations; 30-31 Jan Practical Applications of Terrain Evaluation or Camouflage and Field Fortifications; 27-28 Feb Demolition Practices and Target Folders; and 27-28 Mar Military Explosives or Practical Applications or Terrain Evaluation.

For further information contact the U.S. Army Engineer School, Unit Training Section at Commercial 703-664-3008/5921, or 800-336-3095, Extension 3008; or use Autovon 354-3008/5921.

College degrees made easy

Enlisted servicemembers and warrant officers can now earn job-related associate degrees with fewer problems than ever, through the Army's new Servicemembers Opportunity Colleges Associate Degree program, or "SOCAD".

SOCAD is the first program of its kind in civilian and military adult education. U.S. colleges and universities join a SOCAD network in specific occupational-education fields and are linked to major Army installations. Soldiers then contract with these institutions for associate degree producing programs.

Once a study program is worked out, the college makes a contract with the soldier to award an associate degree when the program is successfully completed. That college then becomes the soldiers "home" school. This way soldiers can transfer anywhere in the world or even separate from active duty and still continue the program at other colleges. Earned credits are transferred back to the "home" school.

When they join the SOCAD network, the institutions agree to provide professional counselors to advise soldiers on enrollment, academic matters, and financial aid. They also help soldiers get college credit for the skills, experience, and knowledge already acquired in their career specialties.

For further information contact your local Education Center or write: Servicemembers Oppertunity Colleges, Suite 700, One Dupont Circle, Washington, D.C. 20036.

12B Basic NCO has math prerequisite

The 12B track of the Basic NCO/Combat Arms trains engineers to be effective squad leaders. It is taught at nine CONUS locations, plus Hawaii and USAREUR. The new AR 351-1, effective April 1981, opens the course to all 12B, 12E, and 12F E-4's and E-5's in a leadership position (E-4's must be graduates of PNCOC).

Due to the technical nature of the course, especially in the area of demolitions, it is considered math intensive. Although many students have a significant problem with math, these problems can be solved prior to the attending the course. Battalion S-3's have been provided copies of the 12B BNCOC Prerequisite Program, which should be administered to the student as soon as possible after he has been selected to attend.

This will help identify weak areas which can then be improved through use of TEC lessons and Programmed Texts.

If you are to attend the 12B track of BNCOC soon, and have not been given this prerequisite test, contact your S-3 as soon as possible. He will make arrangements for you to take this test. (NOTE: Unit S-3's: If you cannot locate copies of the 12B Prerequisite Test, contact the Engineer School at Autovon 354-3632/5363.)

Take home training for 12E's

An Exportable Training Package (ETP) has been developed for MOS 12E. ETP is an excellent refresher for 12E's of all ranks. The ETP should reach units at Fort Hood and throughout Europe during the month of September. All 12E's preparing to attend the BNCOC Course should study up on squad defensive tactics, engineer and bridge reconnaissance, demolitions, and mine warfare. Good luck!

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12F SQT starts soon

As of September 1979, AVLB crew members, CEV crew members, and engineer APC drivers in the Active Army, Army National Guard, and Reserve Components come under MOS 12F (Engineer Tracked Vehicle Crewman). The Soldier's Manuals were published in September 1980 and are available at the AG Publications Center in Baltimore, Maryland.

FM 5-12F/CM is the Commander's Manual (Trainer's Guide), FM 5-12F1/2 covers E1 through E5, and FM 5-12F3/4 covers E6 and E7. The initial distribution has been completed. If you do not have your manuals, you will have to order them from the AG Publications Center in Baltimore using your unit pinpoint distribution system.

Administration of the 12F SQT for the Active Army will begin in January 1982, with the Reserves and National Guard being tested starting January 1983. Now is the time to order your Soldier's Manuals. You will need them for training and preparing for the SQT.

Questions concerning **any** Engineer SQT can be directed to the Engineer School SQT Branch at Autovon 354-6051.

Officer Corps needs enlisted help

More than 30 Army officers are reported missing and a search is underway to locate them.

Officials are certain the missing officers are hidden within the enlisted ranks, appearing to the casual observer as ordinary soldiers. However, certain tell-tale traits distinguish them from their peers: they have obvious leadership qualities and above-average academic skills.

The disappearance of these officers was noticed when, at the end of fiscal year 1980, 20 percent of the classroom slots at the Officer Candidate School remained vacant. The school regularly reserves 160 spaces for active duty soldiers, and this dropoff in enrollment means a loss of more than 30 junior officers with the benefit of previous unit experience.

What accounts for the shortfall? It's definitely not a lack of qualified soldiers, says the Army Military Personnel Center. More than 13,000 active duty soldiers meet the age and education requirement for OCS attendance.

To qualify for OCS a soldier must:

Be an enlisted person or warrant officer on active duty;

Be at least 19½ years old but no more than 29 at the time of enrollment;

Have completed at least two years of a four-year college degree program;

Have a minimum GT score of 110 (males), 115 or higher on the Officer Candidate Test (OCT), and a minimum composite score of 200 on the OCT and Officer Qualification Inventory (OQI). OCT and OQI are not required for females; however, they must have a minimum GT score of 115;

- Meet medical fitness standards prescribed in AR 40-501 and weight standards prescribed in AR 600-9. An applicant must also score a minimum of 300 points on the Physical Fitness Test;
- Accept a three-year service obligation upon graduation.

Enlisted personnel can apply for OCS as soon as they have completed advanced individual training, whil warrant officers can apply at any time. Anyone who would have 10 or more years of service by the date of commissioning is not eligible.

Acceptance to OCS opens the door to training that will move to soldier from enlisted to officer status. But that move can't be made until elegible soldiers recognize themselves as being among the Army's "missing officers".

Enlisted Reserve retirement changes

Army Reserve enlisted members who have completed a full 20 years of active federal service are now eligible to retire with the same benefits as Regular Army enlistees, according to DA officials. Previously, only Reserve officers were eligible for retirement after 20 years of active duty. Enlisted Reservists had to wait until age 60 to collect their retirement checks. The broadened eligibility is the result of recent legislation enacted by Congress.

The change will immediately affect an estimated 500 soldiers who have accumulated 20 years of active federal service through a combination of long tours, active duty for training and annual training. Active duty does not include inactive duty training such as monthly assemblies or any duty performed as a member of the Army or Air National Guard under state control.

Although Army spokespersons have no estimate of the number of soldiers who will be affected annually, they believe that the recently implemented Long Tour Management Program for Reservists will increase the number of men and women eligible for immediate retirement benefits in the future.

For more information and retirement applications, interested Reservists currently on active duty should contact the Military Personnel Office to which they are attached. Troop Program Unit members may obtain information from the Military Personnel Office at the nearest Army installation or by writing to The Commander, Reserve Components Personnel and Administration Center (ATTN: AGUZ-RAD) 9700 Page Blvd., St. Louis, MO 63132.

Promising careers stopped short

A below-the-zone O-4 selectee had been receiving married rate BAQ for a number of years since his divorce. His protests of "I forgot to stop it" and "honest mistake" were undercut by his annual recertifications of dependency in the years following his divorce. In addition to his Article 15, he must reimburse the government the amount of overpayment—and he will do it as an O-3.

An NCO, described as a sure bet for E-8, packaged concrete blocks and shipped them as household goods in his do-it-yourself PCS move. The inflated weight brought him several extra "bonus" dollars, but he got an Article 15, suspended bust, and a sizeable forfeiture—several times the amount of his "bonus".

An E-3, selected for special career training, reported the theft of his stereo from the barracks. He filed a claim and was reimbursed, but investigation revealed he had sold the stereo to a friend and faked the theft in a scheme to finance a costly new system. His false claim resulted in an Article 15 and another than honorable discharge.

The Federal government is gearing up for war against fraud, waste, and abuse. Please, don't be the next casualty.

"ENGINEER MAGAZINE"

Information for Contributors

ENGINEER MAGAZINE is an official Department of the Army publication which provides timely and authoritative information on Army engineering concepts, plans, policies, doctrine, procedures, operations, and developments. Acting as a medium for disseminating information, ENGINEER seeks to increase general understanding of the role and importance of Army engineering, and promote professional development of all officers, enlisted personnel, and civilians engaged in Army engineering activities.

WRITERS; the primary requisite for being published is your message, not your writing ability. If you have something of value to offer, whether it be in the form of a feature article, announcement, photograph, or illustration, we want to hear from you.

SUBJECTS of articles printed by ENGINEER Magazine cover nearly every phase of Army engineering, including systems development or disposal, Unit and MOS profiles, field reports of technical or tactical interest, and more. We are interested in engineer functions at all levels, from the Department of the Army down to the smallest field unit.

STYLE should be clean, concise, and written in the third person active voice. Strive for simplicity in word selection and sentence construction. The editor reserves the right to edit all manuscripts to conform to the ENGINEER magazine style, but substantial technical changes will only be made with the author's consent.

MANUSCRIPTS of feature length articles are generally 1,000 to 3,000 words, but may be longer or shorter in length. News items may be one sentence or several hundred words long, depending on your subject. A single copy of your manuscript should be submitted, typed double spaced. Send whatever art or pictorial support you can. You may want to contact your Public Affairs Office or Post Photo facility to request photographic coverage for your story. Manuscripts should NOT be under editorial consideration elsewhere at the time of submission to ENGINEER Magazine. Manuscripts should NOT contain classified material.

PHOTOGRAPHS help to clarify and explain your manuscript. Black and white 5"X7" prints are preferred, but do not limit yourself to this criteria. Submit all drawings or photographs that go with your story. Captions should be typed on a separate piece of paper and taped to the back of the art work. Don't forget to identify people in photographs by rank, first name, middle initial, and last name.

CORRESPONDENCE between authors and editorial staff is made easier by the inclusion of a complete return address and duty phone number. Contact the ENGINEER Magazine at Autovon 354-3082, and mail manuscripts or other correspondence to: Editor, ENGINEER Magazine, Public Affairs Office, Stop 12, U.S. Army Engineer Center, Fort Belvoir, VA 22060.

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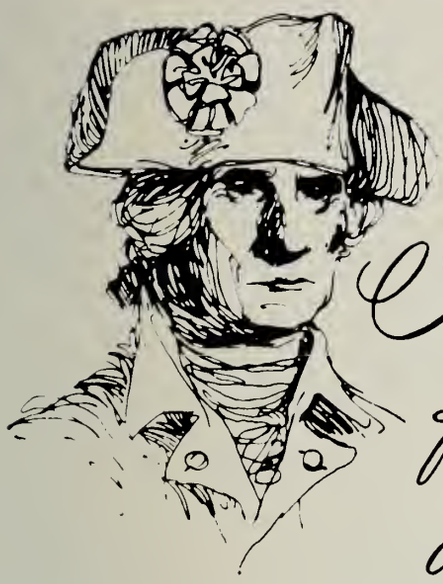

"Impress on every man from the first to the lowest the importance of the cause and what it is they are contending for."

G Washington

GENERAL GEORGE WASHINOTON

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Enlisted pipefitters train at Camp A.A. Humphreys, now Fort Belvoir, circa 1921.

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